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Teen Pregnancy:
Tailoring a pregnancy app to the needs of pregnant adolescents

A thesis

submitted in fulfilment

of the requirements for the degree

of

Master of Social Sciences [Psychology]

at

The University of Waikato

by

JORDANA BEALING



THE UNIVERSITY OF
WAIKATO
Te Whare Wānanga o Waikato

2019

Abstract

Teenage pregnancy is an important issue; adolescence is associated with various challenges and changes, as a result, pregnant adolescents have fewer cognitive, emotional, and social resources to meet the challenges of pregnancy. Stress and distress are often associated with these challenges and many adolescents lack the coping strategies to manage them. Research suggests that stress during pregnancy can have a significant impact on the wellbeing of both mother and child. E-health interventions are being used more frequently to support adolescents with their challenges however, only a small number of these are aimed at pregnant adolescents. Psychosocial interventions for pregnant adolescents have been developed and evaluated, and most of them aim to provide social support, access to professionals and pregnancy related resources. Psychosocial interventions targeting adolescents in general often focus on improving or maintaining their emotional and social wellbeing. E-health interventions are a relatively new yet highly successful mode of support for teenagers as they are easily accessible, less time consuming, inexpensive and therefore more widely available than face to face interventions. ‘Positively Pregnant’ is an E-health intervention using a resilience-focussed model to improve the wellbeing of pregnant women. The purpose of this study was to introduce the ‘Positively Pregnant app’ to pregnant adolescents and professionals working alongside them, to gain their feedback on how we might tailor the app to the needs of pregnant adolescents.

Three professionals working alongside pregnant adolescents were recruited through email and social media. One parenting teen and one pregnant teen were

recruited from their Teen Parent Units (TPU). Feedback was given in individual interviews. Participants were asked their opinion on the challenges that pregnant adolescents experience, the supports they need to manage these challenges and then to give feedback on the 'Positively Pregnant app along with suggestions for how we can tailor the app to the needs of pregnant teenagers.

Three key themes were identified for the challenges and needs of pregnant adolescents: Emotional wellbeing and support, Access to resources, and Cognitive immaturity. Participants responded that the app appeared to be easy to use, interactive and helpful to pregnant teens. Only the professional participants responded with negative feedback which was that the app could be overwhelming for pregnant teens in terms of the layout and wording. Lastly, all five participants provided recommendations for changes, such as: downsizing the app, making it possible to use alongside the users healthcare provider and, adding teen specific and pregnancy related material.

Acknowledgements

Firstly, I would like to thank my supervisor Dr. Carrie Barber. I am grateful for your ongoing support and encouragement as well as all your feedback and guidance throughout this process.

Thank you to all the members of the Perinatal Infant Group (PIG) for your support and advice. It is such a privilege to work alongside such passionate and knowledgeable people.

I would also like to thank my family, without you I would not have been able to get through the last two years. To my Dad and Step-Mum, thank you for bringing me home to be with you so that I could focus all my energy on completing this thesis. Thank you for your patience and encouragement, listening to my struggles and frustrations. I would also like to thank my Mum for all your input into my studies, you are my inspiration and my motivation. Thank you so much for everything that you have done to empower and uplift me throughout my tertiary education.

Lastly, thank you to all my family and friends that believed in me, and told me never to give up on my dreams. I love you all.

My personal experience with mental illness has encouraged me to take on an active role in improving the mental health of others, especially adolescents. I am extremely privileged to be a part of developing an intervention that can hopefully support adolescents to improve their coping skills, health and wellbeing.

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Introduction

New Zealand has a high teenaged birth rate compared to other countries (Pawar, Jackson, & McPherson, 2014). This is concerning because of the many possible negative outcomes for both mother and child. Teenage mothers are at an increased risk of a variety of challenging life outcomes including challenges with education (Kessler et al., 1997; New Zealand Families Commission, 2011), employment (Letourneau, Stewart, & Barnfather, 2004; Quinlivan, 2016), relationships (Myors, Johnson, & Langdon, 2001) and their mental and physical health (Harrison, Weinstangel, & Dalziel, 2011; New Zealand Families Commission, 2011). Stress and distress are a major concern as studies have shown that stress and distress during pregnancy has a significant impact on both mother and baby and may increase the risk of issues later in life (Field et al., 2004; Hobel, Goldstein, & Barrett, 2008; Martini, Knappe, Beesdo-Baum, Lieb, & Wittchen, 2010; Zhu, Tao, Hao, Sun, & Jiang, 2010). Adolescents are at an increased risk of experiencing stress and distress during pregnancy because they are also experiencing stress and distress related to their phase of development (de Anda et al., 1992; Lieberman, Le, & Perry, 2014). It is during this period of their development that they are learning coping strategies to deal with the challenges and changes related to adolescence (Gramling, Lambert, & Pursley-Crotteau, 1998; Myors et al., 2001). Pregnancy is an additional stressor, exposing them to a world they may not be fully equipped to deal with – parenthood (de Anda et al., 1992; Lieberman et al., 2014).

Positively Pregnant is a mobile phone app designed to help pregnant women reflect on and manage the social and emotional changes that come with pregnancy; this app was developed for adult New Zealand women. The purpose of this study was to introduce the 'Positively Pregnant' app to pregnant and parenting teenagers, and the professionals who work with pregnant adolescents, to get their feedback on the challenges of teen pregnancy and parenthood and how this app might be adapted to suit the needs of adolescent mothers.

Chapter 1: Literature Review

Teen Pregnancy: The challenges and changes

Prevalence and factors influencing teen births

Data collected in New Zealand between 1980 and 2013 has shown that teenage births have been steadily declining. In 2013, teenage births made up only 5.9 per cent of all births in New Zealand; that is 0.8 percentage points below the level in 2001, which was 6.7 per cent. The teenage birth rate is declining for Māori as well, down from 72.2 births per 1000 women in 2000 to 53.1 in 2013. Māori teenage birth rates are still significantly higher than the national average, but both are declining, and the gap is narrowing. Although we are still seeing an overall decline in teenage births in New Zealand (Commission, 2011; Pawar et al., 2014), New Zealand still has a comparatively high teenage birth rate to other countries except for the United States (Pawar et al., 2014).

Both international and New Zealand research has suggested that one of the influences for the decline in teen births around the world could be that more teenagers are delaying sex. The proportions of New Zealand students reporting being sexually active were similar between 2001-2007 at almost 30 percent but decreased to 24 percent in 2012 (Clark et al., 2013).

Several studies have made suggestions on how we can continue to influence this decline in teenage births. The suggestions made by these studies may have implications for both pregnancy prevention and intervention programmes such as: preventing subsequent pregnancies and improving the wellbeing of young mums. Families Commission argues that New Zealand schools focus too “exclusively on the mechanics of sex and not enough on the

emotional side of relationships”; they suggest that intervention and prevention programmes need to have a greater focus on healthy relationships, peer mentoring and the use of education through social media (New Zealand Families Commission, 2011). Pawar et al. (2014) state that the influences on the decline in teen birth rates are “multifaceted” (p.6), and therefore interventions will be more effective if they are also multifaceted. For example: cultural differences in norms, values and traditions can influence the increase or decrease of teenage birth rates (Pawar, Jackson, & McPherson, 2014) and thus need to be considered when developing interventions. Research in the United States alone has suggested that an increase in accessibility to information and services for teenagers and a more holistic education about sex and contraception has been linked to the declining birth rate (Pawar, Jackson, & McPherson, 2014). Although these studies are about preventing pregnancies, their suggestions could also be applied to intervention programmes for adolescent mothers in terms of encouraging healthy relationships, social support and preventing subsequent pregnancies.

Characteristics of pregnant teenagers

Social disadvantage

Teen pregnancy is often associated with social disadvantage (Harrison, Weinstangel & Dalziel, 2011; Myors et al, 2001; Pawar, Jackson, & McPherson, 2014), poverty (Rodgers & McGuire, 2012), and single parent homes (Bower, 1997; Cox et al., 2008). Social disadvantage extends beyond financial problems; it also includes education, employment, community involvement and family dynamics (Pawar et al., 2014)

Family instability

Data from the Christchurch longitudinal study suggested that although family income played an important role in teen pregnancy rates, family and individual factors such as abuse, family instability and conflict were a stronger predictor of teen pregnancy (Gibb, Fergusson, & Horwood, 2012). The authors of this study thus concluded that only reducing income inequality would not result in a reduction of teenage pregnancies without also addressing other contextual factors (Gibb et al., 2012). A separate study provided similar results; using a multivariate analysis on data for over 7000 adolescents, Rodgers and McGuire (2012) found that family and/or partner violence, sexual coercion and parenting behaviours predicted early sexual activity and substance abuse.

Health behaviours

Approximately 88 percent of teenage pregnancies are unplanned (Morton et al., 2010). Contraception use has not improved over the last ten years in New Zealand. The percentage of sexually active secondary school students who said they always used contraception to prevent pregnancy remained at 60% across three different surveys done over ten years (Clark et al., 2013). Furthermore,

substance abuse (Bower, 1997; Myers et al, 2001), mental illness, violent or criminal history (Bower, 1997; Cox et al., 2008) and poor academic performance (Myers et al, 2001) are also associated with teenage pregnancy.

Challenges

Teenage mothers are at increased risk of a variety of negative life outcomes involving challenges with education, employment, relationships and their mental and physical health.

Patel and Sen (2012) discuss whether challenges faced by adolescent mothers are due to becoming a young mum or because of the risk factors that predict teen motherhood in the first place. If the poor outcomes can be attributed to experiencing teen motherhood, then prevention of teen pregnancy will be most beneficial to them. However, if the poor outcomes are related to the factors predicting teen motherhood, then prevention programmes targeted primarily at pregnancy may not improve life outcomes for these adolescents. The authors suggest that research should explore whether these outcomes for teen mothers are different from a control group of others their age who had similar life experiences but did not become teen mothers (Patel & Sen, 2012). Thus, having this understanding might help researchers to develop interventions that will support positive life outcomes for pregnant adolescents.

Challenges with education and employment

Teenage motherhood is often associated with gaining minimal education and leaving school with very little or no qualifications. Minimal education frequently transpires into poor employment prospects for young mothers (Kessler et al., 1997; Letourneau et al., 2004; New Zealand Families Commission, 2011;

Quinlivan, 2016). History of poverty or lack of financial stability has been found to be a risk factor for pregnancy (Letourneau et al., 2004). The cycle of poverty or instability is likely to continue if adolescents are lacking social and financial support from family, friends and the government (Letourneau et al., 2004; Myors et al., 2001). Teen mothers are often criticised for contributing to the cycle of poverty as they are largely reliant on government subsidies and benefits (Patel & Sen, 2012). To some adolescents, motherhood (with its financial entitlements) may be viewed as a means of gaining financial stability if there are few alternative opportunities, such as higher education and stable employment (Stewart, 2003).

Poor mental and physical health

Teenage mothers are at an increased risk of both physical and mental health conditions (Harrison et al., 2011; New Zealand Families Commission, 2011), and poor health behaviours which may lead to subsequent pregnancies (Barnet, Liu, & DeVoe, 2008; New Zealand Families Commission, 2011). Patel and Sen (2012) concluded that teen motherhood leads to poorer physical health later in life. They speculate that the financial consequences of teen motherhood, along with the stress of becoming a young mum, leave these women with fewer resources to take care of their physical health. Teenage mothers are at higher risk of severe stress related to financial, social, physical and mental issues (Letourneau; Stewart; & Barnfather, 2004). These issues can contribute to inadequate parenting styles, decreased parent-child interaction and changes to infant development (Myors et al, 2001; Kessler, Berglund, Foster et al, 1997; Barnet, Liu & DeVoe, 2008) which will be discussed further in another section of the literature review.

Relationship instability

During pregnancy, adolescents can experience instability in their relationships with their families (Myors et al., 2001), friends and partners. Adolescence is a time of exploration of identity and independence for the individual, and this can sometimes be a catalyst for conflict with their families (Myors et al., 2001).

Rhodes, Ebert, and Meyers (1994) conducted a study with 129 African American mothers between the ages of 14 and 22. The aim of the study was to assess how relationship problems affected the emotional and financial wellbeing of teen mothers. Interviews with participants used measures that assessed social support, relationship problems, psychological functioning and economic strain. Conflict with the partner and peers increased participants' psychological distress, particularly when under economic strain. Similarly, young mothers reported finding it difficult to maintain relationships with their friends after giving birth to their child (Rhodes et al., 1994).

Stress and coping

Adolescence is marked by social, psychological and physiological changes (Wagner, Rathus, & Miller, 2006); these include changes in hormones, cognitive abilities and sexual behaviours (Gramling et al., 1998). Adolescents experience high levels of stress related to these changes, and this can often lead to issues with their mental, social and physical health (Letourneau et al., 2004). It is during adolescence that women learn coping strategies, both adaptive and maladaptive, to manage stress. These coping styles may either safeguard against or exacerbate

existing stressors (Gramling, Lambert & Pursley-Crotteau.,1998) which either decreases or increases the potential of mental illness.

Coping strategies

Folkman and Lazarus (1980) defined coping as “the cognitive and behavioural efforts made to master, tolerate, or reduce external and internal demands and conflicts among them” (p.223). These coping strategies serve two purposes: problem solving and regulation of emotional distress. Problem solving, or problem focussed coping, aims to improve upon or change a situation either by altering negative behaviours or altering the negative environment. Emotion focussed coping regulates stressful emotions, and the physical and psychological effects of this stress (Folkman & Lazarus, 1980). Coping strategies are used in response to the individual’s appraisal of the threat to them and their ability to cope with the situation (Lazarus & Folkman, 1984). Gender, age and present environment influence the use of coping strategies (Myors et al, 2001; Folkman and Lazarus, 1980; Gramling, Lambert & Pursely-Crotteau, 1998). Some research has found that there are differences in how women of different ages cope with stressful situations (Gramling et al, 1998). Irion and Blanchard-Fields (1987) found that adolescents were more likely to use emotion focussed strategies whereas adults were more likely to use problem solving strategies. Gramling et al. (1998) stated that during their late 20s to early 30s, women begin to use more problem-solving strategies in response to increased responsibilities such as motherhood.

Myors et al. (2001) used a descriptive exploratory design to identify the coping strategies of 71 pregnant adolescents. The participants completed the Revised Jalowiec Coping Scale, which lists 60 coping strategies and participants

are asked how often they have used each coping strategy and then how helpful the coping strategy is. The overall findings of their research suggest that adolescents use specific emotion-focussed strategies such as “optimism, wishful thinking, or daydreaming and seeking social support” (p. 26). Furthermore, they suggest adolescents may be more prepared for coping with parental stress if they develop adaptive coping strategies before giving birth.

Stress during adolescence and pregnancy

Pregnancy can lead to additional stress for adolescents, who are still resolving issues related to their identity. The pregnant adolescent is expected to behave as a mature adult, responsible not only for her wellbeing but also her child’s (de Anda et al., 1992; Lieberman et al., 2014). de Anda et al. (1992) obtained responses from 120 pregnant adolescents on the degree of stress experienced by them during their pregnancy using three measures of stress: The State Trait Anxiety Inventory (STAI), the Sources of Stress Inventory, and the Pregnant Adolescent/Adolescent Mother Stress Measure. Four items were identified as being a major source of stress for pregnant adolescents: concerns about their own wellbeing, pregnancy and delivery, disagreement with parents and, the expectations of acting like an adult but being treated like a child. The unborn baby’s father was perceived to be the individual which caused the most stress; however, members of the pregnant adolescent’s immediate family were a source of stress for very few of the respondents (de Anda et al., 1992).

Loya-Jimenez, Ortiz-Viveros, Martínez, Gutiérrez-Ospina, and Romo-González (2014) conducted a correlational study to assess whether psychosocial stress had a negative impact on pregnant adolescents’ perception of their quality of life, and health. One hundred and twenty-two pregnant women aged between

14 and 35 were asked to fill out three questionnaires to gather information about their background, stress symptoms and perceived quality of life and health.

Results showed that in the presence of stress, parenting adolescents reported negative body image, a high level of isolation and a perceived worsening of their quality of life. Distress and life quality were also related to a perceived lack of free time. Parenting adolescents must abandon the characteristics of adolescence for behaviours more consistent with adulthood, characteristics that they are still learning and developing during this stage of development (Loya-Jimenez et al., 2014).

Studies have shown that social support is strongly associated to perceived stress levels (de Anda et al, 1992). Colletta and Gregg (1981) interviewed 64 African-American adolescent mothers between 14 and 19 years of age. They found that adolescent mothers who reported high levels of social support also reported lower stress levels. Furthermore, adolescent mothers who used “direct action” or problem solving as a coping strategy reported lower stress levels than adolescent mothers who used emotion focussed coping such as redefining or avoiding the problem (Colletta & Greeg, 1981). Conroy et al. (2014) recruited 135 low income teen mothers from a teen-tot program where they received medical and social work support. They were asked to complete online questionnaires from intake to 36 months postpartum. The questionnaires included measures of social support, stress, and maternal self-esteem. Results showed that perceived social support was associated with decreased stress levels. Furthermore, family support in particular was associated with an increased self- perception of the young mothers parenting abilities (Conroy et al., 2014).

Stress and Distress in Pregnancy

Impact on mother

Studies have shown that stress and distress during pregnancy has an impact on both mother and baby (Field et al., 2004; Hobel et al., 2008; Martini et al., 2010; Zhu et al., 2010).

Several studies have suggested that self-perceived distress during pregnancy rather than life events independent of the individual's appraisal predicts negative birth outcomes (Dole et al., 2003; Hedegaard, Henriksen, Secher, Hatch, & Sabroe, 1996; Martini et al., 2010). Robertson, Grace, Wallington, and Stewart (2004) found that distress during pregnancy was the strongest predictor of post-natal depression. 'Distress' in this study encompassed antenatal depression, anxiety, stressful life events, low levels of social support and a history of depression (Robertson et al., 2004).

Depression is often mediated by pregnancy specific stress (Lobel et al., 2008). Women who experience depression during pregnancy show decreased confidence in their caretaking ability and their maternal role (Cox et al., 2008). Women who experience depression during pregnancy were more likely to show conflicted interactions with their toddler (Leadbeater, Bishop, & Raver, 1996), failure to respond to infant cues and report feeling unprepared for parenthood (Beardslee, Bemporad, Keller, & Klerman, 1983).

Lee (2009) examined the relationship between early motherhood and harsh parenting behaviour. The study used measures of harsh parenting behaviour, education, employment, depression, social support, parental support, relationship status, religious attendance and attachment to race and ethnic heritage.

Multivariate analyses suggested that adolescent motherhood predicted harsh parenting behaviour. Adolescent maternal depression especially was associated with harsher parenting behaviours (Lee, 2009).

Furthermore, several studies have shown that compared to non-pregnant adolescents and pregnant adults, pregnant adolescents are at an increased risk of developing depression (Hodgkinson, Colantuoni, Roberts, Berg-Cross, & Belcher, 2010) and have not yet developed the coping mechanisms to deal with the pressures of parenting and adulthood (de Anda et al., 1992; Lieberman et al., 2014). Depressed adolescent mothers are more likely than non-depressed adolescent mothers to seek out intimacy through sexual relationships and are less motivated to use contraception resulting in possible subsequent pregnancies (Barnet et al., 2008). Maternal depression is also a risk factor for insomnia, appetite loss and weight gain not associated to pregnancy (Stone & Menken, 2008).

Although there is plenty of evidence to suggest that stress and depression have a significant impact on pregnant and parenting women, there is a limited amount of research on the impact of maternal anxiety on the mother (Nicol-Harper, Harvey, & Stein, 2007; Weinberg & Tronick, 1998). Most research on anxiety during pregnancy is focussed on the impact it will have on the child's development. However, some research has found that 'anxiety' can have a bearing on women during and after pregnancy (Martini et al., 2010; Weinberg & Tronick, 1998). Women with high depression scores have also been found to have high anxiety scores (Field et al., 2003). Martini et al. (2010) explored the effects of anxiety on motherhood and birth outcomes; they found a link between prenatal anxiety and pre-term delivery, which is also a similar outcome for maternal

depression. In addition, both anxiety and self-perceived distress were associated with postnatal depression, and caesarean section (Martini et al., 2010).

Impact on child

Stress and distress during pregnancy has been associated with preterm delivery (Dole et al., 2003; Hedegaard et al., 1996; Zhu et al., 2010). Lobel et al. (2008) suggested that low birth weight is often mediated by cigarette smoking. Some women in that study reported that cigarette smoking, caffeine consumption and unhealthy eating was part of their coping strategies to deal with stress during pregnancy.

Studies show that stress and distress during pregnancy can also affect the physiologic, cognitive and emotional functioning of offspring (Barnet et al., 2008; Field et al., 2004; Field, Diego, & Hernandez-Reif, 2006; Martini et al., 2010; Siegel & Brandon, 2014; Weinberg & Tronick, 1998) as well as mother-child interactions (Nicol-Harper et al., 2007). Some studies have found an association between anxiety during pregnancy and infants with lower APGAR (Activity, Pulse, Grimace, Appearance and Respiration) scores (Berle et al., 2005; Stone & Menken, 2008). Additionally, offspring of anxious mothers have higher cortisol levels (Weinberg & Tronick, 1998), along with lower dopamine and serotonin levels than infants of non-anxious mothers (Field et al., 2004). Weinberg and Tronick (1998) found that offspring of depressed mothers “look at their mother less often, engage with objects less, show less positive and more negative affect, and have lower activity levels and greater physiologic reactivity as indexed by higher heart rate and cortisol levels” (p.1298). According to Laplante et al. (2004) “prenatal maternal stress has a negative impact on development within the first 2 years of our lives” (p. 408). The result of their study was that prenatal maternal

stress (PNMS) was associated with poorer general intellectual and language functioning at two years of age. Timing was also an important factor; if PNMS occurred during the first or second trimester of pregnancy, infants were more likely to exhibit lower cognitive development. Several other studies have found an association between the timing of stressful events and the impact this has on birth outcomes (Hobel et al., 2008; Zhu et al., 2010) especially the effect that stressful life events or self-perceived distress has on the infant's development.

Stress and distress during pregnancy has also been associated with behavioural differences in infants (Leadbeater et al., 1996; Siegel & Brandon, 2014). For example, mothers who report symptoms of stress, depression and anxiety during pregnancy have also reported that their infants cry excessively and more than infants of mothers with no symptoms (Bolten, Fink, & Stadler, 2012). Martini et al. (2010) found that self-perceived distress during pregnancy has been linked to separation anxiety, ADHD and conduct disorder in offspring. Both studies use self-reported data which may limit the conclusions that can be drawn about the effect that stress and distress has on behavioural differences in offspring.

Weinberg and Tronick (1998) measured the effects of a mother's psychiatric illness on infant functioning. In this study, 30 mothers who were being treated for a psychiatric illness, were compared with a control group of 30 mothers who did not meet the criteria for a psychiatric illness. To evaluate if there were differences between psychiatric and control mothers' interactions with their infant, mother and child were videotaped using Tronick and Weinberg (1990) Face to Face Still-Face paradigm. The interaction consisted of a two-minute face-to-face play with the mother responding to the infant, followed by a two minute

‘still face’ interaction where the mother was unresponsive to her child. In addition, the infant was videotaped during a two-minute face-face play session with a stranger. Results showed that infants of anxious mothers showed symptoms of anger and sadness as well as crying and fussing. Their emotional responsiveness to strangers was also negative and sometimes negative towards their mother, which reinforced the mother’s anxiety.

Similarly, several studies have found that mother-infant interaction is associated to post-natal distress (Nicol-Harper et al., 2007; Siegel & Brandon, 2014). Postnatal distress is associated to the being mother less responsive to their infant and showing a reduced emotional tone during interaction (Nicol-Harper et al., 2007) this is also similar for depressed mothers (Siegel & Brandon, 2014).

Protective factors

Social support has been found to be a strong moderator of psychosocial outcomes during pregnancy; women with high levels of social support report lower levels of stress and distress (Cox et al., 2008; Hobel et al., 2008; Zhu et al., 2010). Dole (2002) found that social support was not associated with the decreased risk of premature birth; however, they did find that it may affect the relationship between high levels of stress and pre-term birth (p.22). This was also the finding of Zhu et al. (2010) who stated that although social support and adaptive coping styles do not change the associations between prenatal stress, pre term delivery and birthweight, social support and coping moderate the impact of psychological stress.

Interventions for Adolescents (Pregnant/Parenting & Non-Pregnant/Non-Parenting)

Interventions designed to support adolescents with their mental and physical wellbeing can be divided into three types: Cell-Phone based, Computer based and Face to Face therapy/ support. A body of research has focussed on designing interventions to support adolescents with their physical and mental health (Bruce & Kutcher, 2016; Kauer et al., 2012; Kenny, Dooley, & Fitzgerald, 2016; Reid et al., 2012) . A smaller body of research has focussed on developing interventions for pregnant and parenting teens (Katz et al., 2011).

E-Health has become a widely used term for describing interventions disseminated through technology. Eysenbach (2001) described e-health as “an emerging field in the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the Internet and related technologies. In a broader sense, the term characterizes not only a technical development, but also a state-of-mind, a way of thinking, an attitude, and a commitment for networked, global thinking, to improve health care locally, regionally, and worldwide by using information and communication technology” (p. 2). This section explores how e-health interventions provide support for adolescents in general as well as pregnant adolescents.

Cell-Phone based interventions

Three types of cell phone-based interventions are commonly used to support adolescents: (1) phone counselling and (2) mobile apps and (3) text messaging. With the improvement of mobile technology there is an increase in people using

their cell phones to manage their day to day activities. In this way it is unsurprising that more people are beginning to use mobile technology to find information and support regarding their health (Wartella, Rideout, Montague, Beaudoin-Ryan, & Lauricella, 2016).

Phone Counselling

Katz et al. (2011) tested the efficacy of a phone counselling intervention aimed at postponing subsequent pregnancies among adolescent mothers. This was done using a randomized controlled trial to compare the intervention and control (usual care) treatment groups on the time to a subsequent pregnancy. Intervention participants scheduled weekly phone counselling for 6 months after enrolment. Fortnightly phone calls were scheduled during the subsequent 12 months with a total of 48 calls over an 18-month period. Participants in the control group received the healthcare and education that was usually provided by their schools and healthcare service. The intervention followed a standardized format which was aimed at supporting and encouraging healthy relationships, safe sex and positive social interactions. Results from that study showed a significant reduction in subsequent pregnancies when there was regular phone calls with the counsellor (Katz et al., 2011).

Mobile Apps

Many studies have focussed their research on how self-monitoring mobile apps can help adolescents experiencing symptoms of depression or emotional dysregulation (Kauer et al., 2012; Kenny et al., 2016; Reid et al., 2012). These apps can also be a way for adolescents to self-monitor their health behaviours and access further information regarding their health (Wartella et al., 2016).

Mobile TYPE is one mobile app which can be used to self-monitor mood, stress, coping, exercise and drug use (Figure 6). The app then shares a summary of that with the user and their health care provider, showing changes in health behaviours over time. Kauer et al. (2012) examined the Mobile TYPE app and the relationship between self-monitoring, emotional self-awareness and depression. Participants were patients aged between 14 and 24 from both rural and urban general practices. Inclusion criteria were participants who were identified as having at least a mild level of depressive symptoms by their doctor. Participants were randomly assigned to either the intervention group (where mood, stress and daily activities were monitored) or the comparison group (only the daily activities were monitored). The study found that self-monitoring increased emotional self-awareness and decreased depressive symptoms. The authors of that study believed that this app could be used as a first step intervention for depression as part of a stepped care approach (Kauer et al., 2012).

Another study introduced the Mobile TYPE app to six paediatricians to help them assess and manage the mental health of their patients over a period of two to four weeks. 92% of the paediatricians found the program helpful, 80% felt that they understood their patients better. Forty-seven adolescent patients were also interviewed. Eighty-Eight percentage of these patients felt that the data given to the paediatrician was accurate and represented their actual experiences, 65% believed it was helpful and 77% felt that it helped their paediatrician understand them (Reid et al., 2012). The findings of this study support the clinical use of Mobile TYPE with adolescents, though additional clinical trials of specific measures of symptoms or wellbeing would provide more substantive support.

Patient	
I - Mood	
Patient mood fluctuated across the week: on some days there was little evidence of negative mood, and on others, particularly most days in week 2 she reported moderate negative mood. There were no days of very negative mood.	
II - Stress & coping	
Stresses:	Patient recorded three stressful occurrences in the second week, which may account for her elevated negative mood during that week. Two of these stresses were conflict with her boy/girlfriend
Coping behaviours/actions:	Patient reported crying and 'didn't do anything' as her two most common coping strategies. She did report the strategies that can be helpful which are relaxing and watching TV or listening to music
Coping thoughts/cognitions:	For each stress she reported blaming herself, catastrophising, and wishing her stresses away. Importantly, she reported two instances of thinking of hurting herself. It is notable that there were no positive or helpful cognitive coping strategies
III Maintaining wellbeing	
Activities:	Patient appears to spend the majority of her time at home or at work. She reported being with her boy/girlfriend predominantly, followed by being alone or with coworkers. There were very few accounts of spending time with friends which is unusual for someone her age. Many of the activities she reported were watching television, relaxing/resting/ sleeping, talking or working. More social activities did not seem to feature very often.
Sleep:	Patient reported having between 8-10 hours' sleep each night
Alcohol:	Patient reported one drinking occasion across the 2.5 weeks in which she consumed six glasses of mixed spirits (approximately 1.5 standard drinks) to feel good or have fun. This equates to approximately nine standard drinks and falls in the moderate risk drinking for short term harms according to the NHMRC criterion
Eating:	Patient skips breakfast often, but eats lunch and dinner every day. She reported eating snacks and consumes 1-2 serves of junk food and 2 serves of soft drink each day
Exercise:	Patient reported two occasions of exercising across the 2.5 week period, one being 1-1.5 hours at the gym and the other was not specified but was for less than 30 minutes
Television/computer:	Patient reported watching up to 4 hours of television in a day, however, she mostly appears to watch between 1.5 to 2 hours per day
IV - Useful resources/recommendations	
Patient appears to have some low days, and may find it difficult to lift out of these. She has a tendency to blame herself and turn to the worst outcome when faced with stresses, in particular, conflict with her partner. She also thinks of harming herself but did not report that she did so. There is a strong sense of hopelessness about her coping behaviours, as she reports crying and not doing anything most commonly. These unhelpful coping strategies may contribute to her low mood, especially in the absence of positive strategies of which she reported none. Her daily activities also seemed a little socially isolated with few reports of spending time with friends. There was little to note in particular concerning her sleeping and drinking patterns. She does not exercise often, and she skips breakfast most days.	
Reviewing her coping strategies with an emphasis on helpful coping may be useful. Handouts that may be applicable are:	
1. 10 questions to help think about stress	
2. Problem solving	
3. Depression and thinking	

Figure 1.Screenshot: 'An example of the summary report page of the mobile TYPE website' From (Reid et al., 2012)

Mind Your Mind (<https://mindyourmind.ca/>) provides various tools for users between the ages of 14 and 29 to access online and on mobile apps. Some of these tools are available in English, Punjabi and French. These tools are designed to educate users about stress and coping, how to manage their money, healthy eating, problem solving and developing a plan for their wellbeing (**mindyourmind**, 2005). This organisation has also taken part in several projects regarding youth mental health, and engaging youth in the creation and development of tools to help improve their health and wellbeing. One such youth engagement initiative suggested that “Youth engagement can improve the accessibility, effectiveness, and sustainability of programs and resources for youth” (Huggett, Flynn, Jaouich, Taylor-Gates, & Davidson, 2017, p. 121). The authors of this initiative developed

an app called ‘Be Safe’ which was designed to support local youth in London, Ontario to manage their mental health and access local support services. To develop this app, youth were recruited through a separate initiative called ‘Service Collaboratives’ which aimed to improve the care of youth with mental health and addiction needs. Youth members of the ‘Service Collaboratives’ engaged with various healthcare, welfare, education and justice providers of youth mental health and addiction support. These youth took on a leadership role in the development and dissemination of the ‘Be Safe’ app by gathering information (such as compiling a detailed list of youth service providers across the London-Middlesex region), sharing their opinions on how best to engage youth to use the app, and finally the dissemination of the app to service providers and other stakeholders. All of this planning and development of the app took place over a weekend long intensive development session with other stakeholders who were involved in the development of the ‘Be Safe’ app (Huggett et al., 2017). So far, no research has been undertaken to examine the effectiveness of this app.

Kenny et al. (2016) introduced a prototype of a mobile app called ‘Copesmart’ to a group of adolescents. Thirty-four adolescents aged between 15 and 16 were recruited from two single-sex secondary schools in Ireland. During focus groups, participants were asked to give their opinion on the needs and concerns of adolescents in relation to mental health mobile technology. Data from these focus groups were analysed using a thematic analysis. Eight core themes were derived from the analysis of the data as being of significance to these teenagers: safety, engagement, functionality, social interaction, promoting awareness, accessibility, gender and young people in control (Kenny et al., 2016). The first theme was ‘Safety’, in terms of confidentiality, bullying and stigma.

Participants responded that the user of the app should be able to control the privacy and whether they want to share personal information. Anonymity was important to avoid cyber-bullying. Stigma was also a concern because participants felt that other people knowing they were using a mental health app might create stigma. 'Engagement' was the second theme identified; participants emphasised that apps need to be interesting and the information provided by the app needed to be "concise and to the point" (p.9). Furthermore, participants believed that the content of apps needed to be fun, interactive and colourful. The third theme identified was 'Functionality'; participants responded that mental health apps need to be relevant and useful in terms of mental health as well as providing access to resources and professional help. The next theme identified was 'Social Interaction'; adolescents felt that they wanted to be able to interact with their peers to share experiences and provide and receive advice. 'Promoting Awareness' was the next theme identified; in terms of promoting the use of mental health apps to increase the social acceptability of adolescents using them. 'Accessibility' was also important to the participants; emphasis was placed on affordability and ease of access. 'Gender' was also an important theme identified; female participants responded that they would use the app regardless of their emotions however, male participants responded that they would only use the app if they were feeling depressed. The last theme that was identified was 'Young people in control'; participants emphasised the importance of young people being in control of whether or not they use mental health apps. The study is important because it provides a model of use of consumer input in app development. Consumer input allows for interventions to be tailored to the needs of adolescents.

Text messaging

A text messaging intervention to educate pregnant adolescents about nutrition and physical activity was designed with help from professionals working in the field (Martin, 2015). After review by these professionals, the text messages were then reviewed by pregnant and parenting adolescents during focus groups. Participants were asked to give feedback on the relevancy of the content to being pregnant, whether the language was understandable, and what changes or improvements were needed. Feedback from focus groups with professionals and adolescents indicated that young women appreciated specific examples of healthy and nutritious foods for them to eat during pregnancy. They also showed a need for information on positive health behaviours and expressed a desire to learn about which types of physical activities were good for them during pregnancy (Martin, 2015).

Computer based

The advent of technology and the improvements in access to information and support online has brought about a need for research and evaluation of the types of information and support that people will come across. Some information found online can be misleading and/or incorrect. Therefore, there have been several studies done to investigate which computer-based interventions are most effective and provide accurate information and support to adolescents in terms of their mental and physical health. Some studies have focussed specifically on interventions for all adolescents, including 1) Social media, 2) E-therapy, 3) Informational emails/websites

Social media

Online communities can be a good place to interact with people of similar age groups and life experiences. Furthermore, they can empower the individual through the sharing of knowledge and personal experiences that support informed decision making. However, this can also have negative implications; users can be given false information, and can also give out false information (Sherman & Greenfield, 2013). In order to examine how pregnant and parenting adolescents use online forums, Sherman and Greenfield (2013) randomly selected 200 threads from four online forums for all adolescents including those that were pregnant and parenting. Using a mixed-methods content analysis of the original posts, the authors found that there were frequent examples of emotional, instrumental and informational support. ‘Instrumental support’ was defined as the offering of private and personal support (such as a personal friendship outside of the group). In forums where pregnant and parenting adolescents were the majority, responses were mostly positive; however, in forums where they were the minority, responses were more negative. The researchers suggested that receiving support from other pregnant or parenting teenagers could possibly improve the wellbeing of pregnant teenagers. Non pregnant and non-parenting teens had a negative impact on their pregnant and parenting peers wellbeing; possibly because they did not have the personal experiences and knowledge to provide the right support (Sherman & Greenfield, 2013).

‘Cybermoms’ is a computer-based peer support group for pregnant and parenting teenagers. The main aim of developing this was to reduce social isolation and provide access to education, peer support and life skills to these

young women. The study recruited 35 pregnant and parenting teenagers to take part in the study. Only 15 of the original participants stayed in the study for the duration of the project (3 years). There was between 30-35 participants using the program at any given time. Participants were selected according to their housing situation (they had to be in stable housing) as the aim of the study was to support pregnant and parenting teenagers who lacked social support and were socially isolated. Quantitative and qualitative data were regularly collected. Structured interviews took place at intake and follow-up. A self-report questionnaire gathered information such as: living situation and income, family background, social support, and health and wellbeing. Follow-up interviews occurred every 12 months in which in-depth information was gathered about changes in their living, income, relationships, social support and health and wellbeing. During a three-year project, weekly live chat sessions were scheduled to discuss topics that were important to the users of this group. Sometimes guests with expertise would take part in these chats and users were able to ask them questions. Taking a strengths-based approach, this programme encouraged young mothers to educate themselves on healthy pregnancy behaviours, positive parenting styles and child development. Self-report and interview data suggest that participants benefitted from having access to peer support as well as helpful resources to help them overcome obstacles and learn valuable skills (Kauppi & Garg, 2008).

‘Staying connected’ is an online support group that was designed for single adolescent mothers to reduce social isolation and stress related to being a single parent. Dunham et al. (1998) carried out a study with 42 single mothers from a low socioeconomic background who relied on government resources and were currently unemployed. ‘Staying connected’ offered them the opportunity to

post messages and send private emails to other users using an anonymous username and password. A descriptive analysis of the discussions on the public forum showed that the majority of the replies to concerns posted provided positive support. Both the pre-post self-reported data and descriptive analyses showed that participants had developed close personal relationships which provided them with emotional, informational and instrumental support. Analysis also showed that mothers who took part in the forum regularly reported a decrease in parenting stress. There was no control or comparison group, so this may have affected the conclusions they can draw about whether the outcomes were due to the group, or just natural change over time (Dunham et al., 1998).

In a similar study of social networking sites, seven adolescent mothers within Western Australia were interviewed about their experiences with networking sites for teen mothers. A thematic analysis found that social networking sites provided social support through emotional and informational support to adolescent mothers. Furthermore, they found that instrumental support was only provided by friends and family who could provide support in person. These young woman responded that the emotional support they received increased their parental confidence, and reduced parental stress (Nolan, Hendricks, & Towell, 2015).

E- Therapy

E-therapy programmes that are based on Cognitive Behavioural Therapy are aimed at reducing the symptoms of depression and anxiety (Calear, Christensen, Mackinnon, Griffiths, & O'Kearney, 2009). This can be beneficial to a large number of people who do not have access to a healthcare provider such as a psychologist or counsellor (Bruce & Kutcher, 2016).

The Youth Mood program was aimed at investigating the effectiveness of an internet-based program called Mood GYM. Based on the principles of CBT, Mood GYM aims to change dysfunctional thoughts and beliefs, improve self-esteem and social relationships and teach problem solving and relaxation techniques to adolescents. There are five interactive modules containing information regarding depression and anxiety and how to reduce these symptoms. Topics include: personal development, physical education, mental health and religious education. A cluster randomized controlled trial was conducted in 30 schools across Australia. A total of 1,477 students took part in this study. Of the 1,477 students, 563 were allocated to the intervention condition and 914 were allocated to the wait-list control condition. Participants were not selected for having high levels of distress. Post-intervention and six months follow up showed that participants in the intervention had significantly lower levels of anxiety than the wait-list control participants. Results also showed different effects by gender, with only males showing a significant reduction in depressive symptoms and both genders showing slightly lower levels of anxiety (Calear et al., 2009). The authors cited a possible explanation for this gender difference; Garber (2006) found that males may prefer CBT as a more systematic and logical approach to deal with negative thoughts and feelings, whereas females may prefer an interpersonal approach that involves them being able to share their thoughts and feelings with another person. This is an important finding and may have implications for e-health interventions for pregnant adolescents.

In a study of computerized therapies, Pennant et al. (2015) systematically reviewed 27 randomized controlled trials of computerised psychological therapies for young people between the ages of 12 and 25. These therapies were CBT,

problem solving therapy and interpersonal psychotherapy. Studies of clinical and non-clinical populations were included. This review found that for young people between the ages of 12 and 25 at risk of anxiety and depression, computerized CBT reduced symptoms of anxiety and depression (Pennant et al., 2015).

Interventions aimed at reducing symptoms of anxiety tended to have more therapist input than interventions for depression and anxiety-depression. Mood GYM was one intervention with little to no therapist input (Pennant et al., 2015).

Similarly, Podina, Mogoase, David, Szentagotai, and Dobrean (2016) conducted a meta-analysis to investigate the effectiveness of eCBT in comparison to standard CBT or waitlist control for children and adolescents. This included eight randomized controlled trials aimed at reducing anxiety symptoms. Results showed that eCBT was as effective as standard CBT and more effective than waitlist control. Moderation analyses found that anxious children and adolescents benefitted most from computerized CBT programs when there was minimal therapist involvement.

Loucas et al. (2014) conducted a review of randomized control trials of e-health interventions for mental health problems in children and adolescents, either through therapies with minimal therapist input or computerized therapies with no therapist input. In addition, researchers held two focus groups which were shown four eCBT programs for anxiety and/or depression. During focus groups, participants responded that programs needed to be interesting and up to date, users needed to feel as though they were able to make their own goals and play an active part in therapy. Having access to a therapist or professional who could answer questions and provide further encouragement was also important to them. The strongest evidence was for the use of eCBT programs for depression in

adolescents. There was less evidence for the effective use of eCBT programs for anxiety in adolescents (Loucas et al., 2014).

Informational emails/websites

As previously mentioned, some mobile or computer programs provide additional information for users that they may not be provided by their GP or midwife. This information can come in the form of links to helpful websites or specific information being emailed to them that is significant to them. For example, Mobile Type will email the user graphs of their moods over time, which can also be shared with the user's healthcare provider to help tailor their support to the needs of the individual (Kauer et al., 2012).

Costin et al. (2009) conducted a randomized controlled trial with 348 youth between the ages of 19 and 24. Participants were allocated to either the low distress group or high distress group after completing the Kessler Psychological Distress Scale (K10), a pre-intervention measure of depressive symptoms. They were then randomly assigned to one of three conditions: control, basic intervention or enhanced intervention. All three conditions received health e-cards for a period of three weeks via email. Participants in the basic intervention received information about depression such as symptoms, examples of people's experiences of depression, where to find information online about depression and treatment options. Participants in the enhanced intervention received additional information about treatment options and what to expect from consultations with their healthcare providers. The control condition delivered information about general health issues unrelated to depression. There was no evidence that the intervention made any difference in help-seeking help seeking behaviours, nor did

they improve beliefs about depression treatments or the ability to identify symptoms. They did, however, increase beliefs about the importance of help resources (Costin et al., 2009).

Overall, some research has examined the process of development for e-health interventions for adolescents, but very little research has examined the effectiveness of these interventions in improving the wellbeing of adolescents. Furthermore, the few studies that have researched the effectiveness of these interventions, have provided limited or unclear conclusions.

Face to Face therapy/support

Cognitive Behavioural Therapy (CBT)

A meta-analysis of psychotherapies done face to face shows that cognitive behavioural and interpersonal therapy were most effective at treating depression in youths aged 12-18, especially those with moderate – severe depressive symptoms (Watanabe, Hunot, Omori, Churchill, & Furukawa, 2007). Results from this analysis also showed that the effectiveness of most psychotherapies was no longer significant after 6 months (Watanabe et al., 2007). Other studies have found CBT to be helpful with treating eating disorders (Gowers, 2006), substance abuse (Kaminer, Burleson, & Goldberger, 2002), self-harm and suicidal ideation (Harrington, 2001) in adolescents.

Clarke, Kuosmanen, and Barry (2015) conducted a systematic review of mental health interventions for young people living in low- and middle-income countries. This identified 22 studies which employed randomized control test and quasi-experimental designs, 14 studies of school-based interventions consisting of

interventions for children living in areas of armed conflict, and teaching life skills and resilience. Eight studies evaluated community-based interventions for adolescents that aimed to improve their behavioural and emotional wellbeing. Two independent reviewers assessed the quality of the evidence using the 'Effective Public Health Practice Project' criteria. The findings from most of the school-based interventions were strong. Interventions for children living in conflict areas showed positive effects on participants' emotional and behavioural wellbeing, including improved self-esteem and coping skills. School-based life skills and resilience programmes showed positive effects on self-esteem, motivation and self-efficacy. Results from the community-based intervention studies showed a positive effect on the mental and social wellbeing of adolescents.

Relaxation techniques

A variety of relaxation techniques are used in interventions with adolescents in general as well as specific interventions for pregnant adolescents. These include biofeedback and guided imagery. Flynn, Jones, and Ausderau (2016) examined the efficacy of a guided imagery intervention in reducing perceived stress in pregnant adolescents using a pre-post intervention measure of perceived stress levels. Thirty-five pregnant adolescents were recruited from a Teen Parent Units (TPU) in Washington. The participants listened to a pregnancy-specific guided imagery on four occasions during their pregnancies. These listening sessions took place in the TPU classroom. The study found that the most significant reduction in stress occurred after the first session, but the effect appeared to decrease over time. This meant that after the first session, stress levels didn't decrease as much (Flynn et al., 2016). The validity of these results could be questioned due to

participants self-reporting their perceived stress. Further limitations of this study included a lack of a control group, lack of sample diversity, and an interruptive school environment. Future research may consider a neutral environment in which to conduct intervention sessions; as the classroom in which they mainly carried out may be considered a confounding variable as a possible stress-inducing environment for them. Nevertheless, this study has introduced a possible intervention that could be useful for pregnant adolescents to help manage stress.

Social support

Social support is a recurrent theme in many studies as being of tremendous significance to the improvement and maintenance of adolescent health (Clarke et al., 2015; Colletta & Gregg, 1981; Conroy et al., 2014; de Anda et al., 1992; Devereux, Weigel, Ballard-Reisch, Leigh, & Cahoon, 2009; Dunham et al., 1998; Flynn et al., 2016; Kauppi & Garg, 2008; Letourneau et al., 2004; Nolan et al., 2015; Rhodes & Woods, 1995; Sherman & Greenfield, 2013; Siegel & Brandon, 2014).

According to Conroy et al. (2014), pregnant adolescents' reports of social support is closely related to levels of depression and stress. The study found that if mothers were receiving financial and social support from the government, external agency or family, then depression and stress levels were likely to be lower. Similarly, Cox et al. (2008) aimed to investigate the relationship between depressive symptoms in adolescent mothers, social support and perceived parental efficacy. Baseline demographic information was collected from 168 adolescent mothers, using structured interviews at two weeks post-partum. These included data on education, family structure, living situation, relationships and history of physical and psychological illness. Furthermore, standardized measures of

depression, social support and maternal self-esteem were administered pre-test and post-test. The analysis showed a relationship between depression and the mother's perception of a lower ability to take care of her child. Social support moderated this by decreasing depressive symptoms.

Rhodes and Woods (1995) examined how social support alleviated the adverse effects of social strain. Participants were 157 pregnant, minority teenagers who attended a school for pregnant adolescents (Rhodes & Woods, 1995). Each student was interviewed and asked to do several questionnaires about their mental health, life events and background information. Data derived from these interviews and questionnaires provided information on the effect that a specific type of social support had on adolescents' self-perceptions of stress and social strain. The authors used the term "cognitive guidance" to describe the type of social support these teenagers received from their teachers and mentors. They concluded that "cognitive guidance" can reduce stress in pregnant adolescents and aid them in finding healthy coping strategies. Adolescents learnt about social relationships, gained access to helpful resources and managed their mental health with the support of these mentors. The findings from that study support having alternative education for pregnant adolescents such as teen parent units, because they provide mentoring and guidance from other pregnant adolescents and adults with knowledge of pregnancy and adolescent wellbeing.

The Benefits and Limitations of E-Health Interventions

Benefits of using E-Health interventions

E-Health interventions are easily accessible to a large population (Bruce & Kutcher, 2016; Podina et al., 2016), and involve small amounts of health provider

time and resources (Bruce & Kutcher, 2016). This is important because one of the many challenges for pregnant adolescents is difficulty accessing healthcare providers (Commission, 2011). E-health interventions are more widely available than face to face interventions (Bruce & Kutcher, 2016). They are also portable, which means they can be accessed when and where the user needs (Podina et al., 2016).

Affordability is an issue for parenting teens, and if they can't afford to see a health care professional or are not gaining support elsewhere this can be an issue for them. E-health interventions are affordable (Bruce & Kutcher, 2016; Dobson et al., 2017; Moorhead et al., 2013; Podina et al., 2016; Sousa, Fonseca, Gaspar, & Gaspar, 2014) and time saving for clients (Podina et al., 2016).

Confidentiality is an important issue; most e-health interventions are designed to be confidential (Podina et al., 2016). Users can be given anonymous logins and passwords so they do not need to share private details about their identity (Dunham et al., 1998). Social media sites that provide online support groups can be moderated or facilitated by someone who can answer users' questions and provide link to other support networks. Some online forums facilitate relationships between adolescents and counsellors, or other health care providers (Katz et al., 2011; Moorhead et al., 2013). For example, '*Cybermoms*' provides users access to professionals who can answer questions for them and they can talk to about their concerns (Kauppi & Garg, 2008). Furthermore, online support groups provide social and emotional support from peers (Moorhead et al., 2013) which also means that they are able to share experiences and learn from each other (Sherman & Greenfield, 2013).

Moorhead et al. (2013) conducted a systematic review of literature to identify the uses, benefits and limitations of social media for the public as well as health professionals and their clients. They found there were six main benefits, including increased interactions with peers, which also provides both emotional and social support from peers. Social media can provide accessibility to health information, which is shared in online forums and tailored to the age group and context (i.e. pregnancy). The information shared on social media provides an opportunity to monitor public health which may also influence healthcare policy.

Limitations of using E-Health interventions

The main limitations of using E-health interventions are concerns about the quality of the interventions (Bruce & Kutcher, 2016; Kauppi & Garg, 2008; Moorhead et al., 2013). Whilst some studies have stated that confidentiality (Podina et al., 2016) is a benefit of e-health interventions, there are also some studies that state that this could be a limitation (Kauppi & Garg, 2008; Moorhead et al., 2013). Kauppi and Garg (2008) state that online forums could be problematic due to the lack of privacy and a potential for hacking. Kauppi and Garg (2008) also stated that there is a potential for exposure to racism and explicit materials on social media. They suggest however, that this could be beneficial to users as it teaches them how to manage victimisation and harassment. Some online forums are moderated, and this appears to reduce the risk of bullying and harassment (Barak, Klein, & Proudfoot, 2009). Confidentiality has also been brought up as an issue due to the difficulty of responding to someone in crisis (Bruce & Kutcher, 2016) especially for those who have gone undiagnosed with a serious mental illness.

Furthermore, electronics cannot pick up on and interpret non-verbal cues (Bruce & Kutcher, 2016). Thus, if somebody was in crisis it would be even more difficult to respond to them (Ebert et al., 2018). This may not necessarily be considered a limitation of e-health interventions as such, but it has been addressed in the literature as being an issue.

Ebert et al. (2018) identified some potential risks of e-health interventions; 1) limited ability to identify at risk patients and give an accurate diagnosis 2) reduced self-efficacy if participants are not successful with using e-health interventions, 3) development of negative attitudes towards standard psychological interventions 4) the development of a dependency on technology for therapeutic safety, 5) possible worsening of symptoms and lastly 6) the delivery of potentially harmful information. This last point is also mentioned by several other studies that are specific to social media; and have expressed concern about unreliable or misleading information (Moorhead et al., 2013; Sherman & Greenfield, 2013) being disseminated to users on social media. Clearly, this highlights a need for moderation of information online. That can be difficult however with so many people using social media every day.

Positively Pregnant app

The current study is part of a pilot research project which aimed to evaluate the effectiveness of a newly developed smartphone app called ‘Positively Pregnant’. Led by Carol Cornsweet Barber, a team at the University of Waikato piloted the app with pregnant women in New Zealand in 2017 and 2018.

‘Positively Pregnant’ is an interactive tool specifically designed to support pregnant women through the perinatal period. Using a framework that incorporates positive psychology and cognitive behavioural principles, the app is aimed at improving management of pregnancy related issues and the transition through to parenthood. ‘Positively Pregnant’ provides a variety of tools which enable pregnant women to reflect on their strengths, stressors, support network and strategies for improving and maintaining their wellbeing during pregnancy. The app also provides suggestions for healthy coping strategies to manage stressors, provides information about pregnancy related issues and recommends links to organisations which can provide further support.

‘Positively Pregnant’ consists of four different types of modules: “Know Yourself”, “Do Something”, “Find Out” and, “Conversations”. A brief overview of each is given below.

Know Yourself

This section of the app is a set of self-assessment tools, in which participants complete short questionnaires and receive feedback and suggestions based on the answers they gave. There are seven components which help the participant to assess their strengths, coping strategies, stressors, supports, and health behaviours.

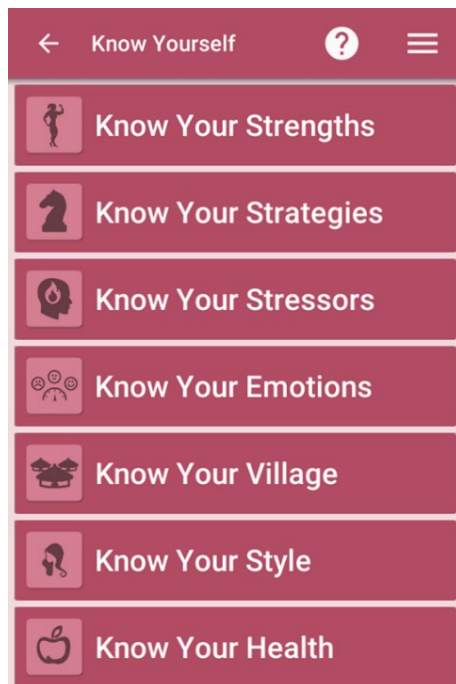


Figure 2. Screenshot: Module #1 “Know Yourself”

“Know your strengths” is a self-assessment of a person’s physical, intellectual, and interpersonal strengths as well as access to financial and social resources. Strength Reminders are compiled in a ‘toolbox’ which is found on the homepage of the app. The app selects the highest-rated strengths and resources, paraphrases them to emphasise this strength and the values associated with them, and suggests ways to act on or use those strengths.

“Know your strategies” asks the participant to answer questions about relaxation techniques, health behaviours and stress management that they may or may not have tried. For example, some strategies such as meditation, taking a bath, reading a book and exercising. The app then creates a ‘toolkit’ of strategies that they have chosen as something they have or would try and provides prompts to encourage them to use these strategies.

“Know your stressors” is another self-assessment tool of general and pregnancy-related stressors for the participant. The app then gives them feedback and suggestions for where to go for further information and support related to the particular stressors they have experiences.

“Know your emotions” asks participants to rate their daily moods and will then provide feedback, which is a graph of positive and negative mood states over time, and also if their mood ratings are consistently low, they receive a notification suggesting that they get support. Participants can also choose to receive daily reminders and can also control at what time of the day they receive this reminder.

“Know your village” asks the participant to fill in names of people around them that they trust and who will provide support during their pregnancy. The ‘village’ is displayed graphically as a circle of people available to the woman, and the names she has provided are associated with the roles they can play.

This information is confidential and nobody else will see these contacts except for the person using this app.

“Know your style” is a self-assessment of participants’ perceived locus of control, decision making and desire for control. There is also a separate self-assessment for their partner to complete; they can then compare their styles and identify areas of difference and similarity. The app will also provide feedback on how their styles might influence their individual and joint decisions and interactions as parents.

“Know your health” is a self-assessment tool for identifying health behaviours and health goals in terms of eating and drinking, drugs, activities and

healthcare. The app then provides feedback and suggestions for healthy goals, and links into a health goal-setting tool for areas they wish to target for change.

Do Something

This part of the app is aimed at providing activities that participants can do to manage stress, relax and diary their thoughts and experiences.

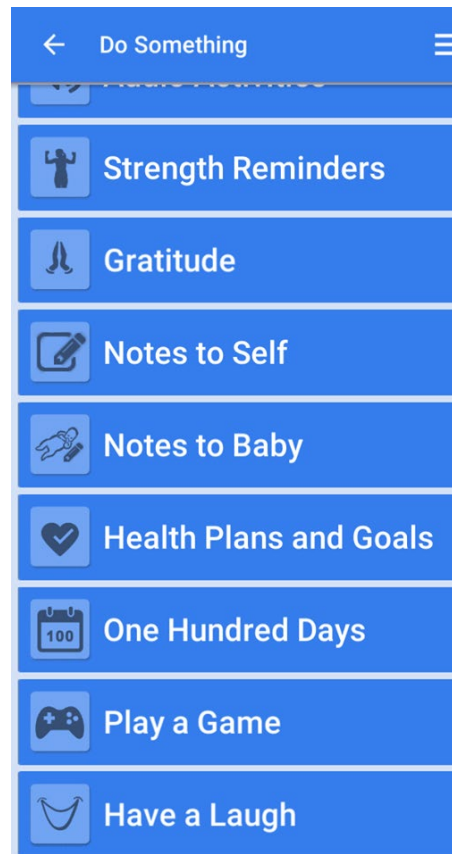


Figure 3.Screenshot: Module #2: “Do Something”

“Audio Activities” consists of six different narrated activities that guide the user through various relaxation techniques such as: body scan, breathing, stretching and guided imagery.

“Gratitude” allows the participant to diary things that they are thankful for, or positive things experiences they have had. Participants can choose to set a daily reminder so that they can write something positive that happens each day.

“Notes to self” allows the participant to write themselves positive affirmations. They can also set a daily reminder so that they can go back and see what they have written to provide themselves with encouragement.

“Notes to baby” allows the participant to diary memories or photographs for the baby as a memento of their pregnancy. This is another section that participants can set a daily reminder for.

“Creativity100” encourages the participant to pick a creative activity such as making origami, drawing a picture or writing a poem. This also provides a tool for recording and preserving the activity. The user can take photos or write in the module as a diary.

Participants can play a “game” called Hatch3 - a relaxing matching game with a theme of hatching and developing young.

“Have a laugh” provides a link to videos on You tube, the default being ‘funny baby videos’.

Conversations

This module of the app suggests different types of conversations that the user could be having with their partner or support person about important aspects of birthing and parenting.

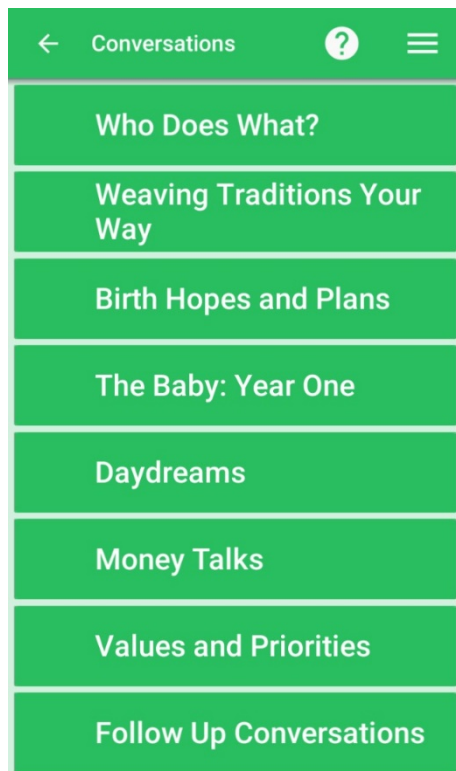


Figure 4. Screenshot: Module #3: “Conversations”

“Who does what” invites the participant to make plans about daily tasks and chores around the house. Ideally, both the participant and their partner can also do the same self-assessment. Feedback is given about which questions participants and their partners disagree on, which provides the opportunity for further discussion.

“Weaving traditions” provides prompts for topics in a conversation that the participant could have with their partner about which beliefs and practises they would both like to introduce into their child’s life.

“Birth hopes and plans” encourages the user to discuss preferences for where and how they would like to give birth and to create a plan. Users are also encouraged to share these hopes and fears with their partner and midwife.

In “The baby: Year 1” participants discuss with their partner their hopes for their baby’s first year regarding feeding, getting the baby into a routine, sleep and catering to the baby’s needs.

The section called “Daydreams” suggests that the user and their partner or support person talk about what their hopes are for their child’s future, how they want their child to be brought up and, the values they want to instil in their child.

“Money Talks” is about helping the participant and their partner or support person to consider their finances. This includes maternity leave, government benefits, debts, tracking accounts, paying bills, savings accounts, and baby’s expenses and budgeting with a link to a free budgeting tool.

Lastly, “Values and Priorities” is about the user and her partner thinking and talking about how they see themselves as a parent and, their expectations for themselves and their child.

‘Follow up conversations’ are items that the participant has flagged as things they want to go back to.

Find Out

This section of the app is all about information gathering that is relevant to the participant and their pregnancy. These five sections each contain five to eight different brief informational topics, ranging from 200 to 2500 words, about the social and emotional aspects of pregnancy and early parenting.

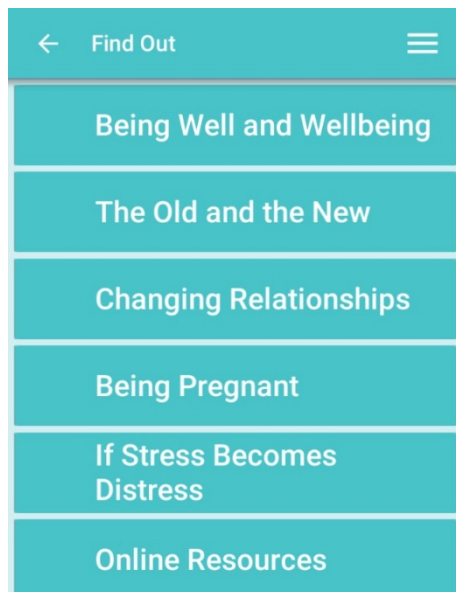


Figure 5. Screenshot: Module #4: “Find out”

“Being well and wellbeing” provides tips on self-care, mind and body balance, stress and coping and how to find relevant information from reliable sources.

“The old and the new” is about life before and after pregnancy and how to manage these changes.

“Changing relationships” includes seven brief informational topics about managing different relationships during and after pregnancy.

“Being pregnant” includes seven brief informational topics about the differing experiences of pregnancy including birth plans and fears.

“If stress becomes distress” includes seven brief informational topics about managing stress and moods as well as where to go if the participant needs further support or information.

“Online resources” provides links to informative websites associated to pregnancy and parenting.

A list of all the topics in this module is provided in Appendix I

Addressing stress and distress

Positively Pregnant has many tools that support users to address the things that are currently stressing them out and what could potentially cause them stress. From there, the app makes recommendations about what the user could do to reduce or manage their stress. ‘Know your Stressors’ is where users will find this support. They can rate how often certain situations could be creating stress for them in the previous 2 weeks. Stressful situations are categorised as pregnancy related or general situations (i.e. moving to a new house). After rating these situations, the app gives feedback and suggestions on how to manage the situation and coping strategies that might be helpful. The first module called ‘Know Yourself’ is about preparing the user for managing and dealing with stress and distress. If this section is done methodically, it can be a step by step process of working through finding techniques that they may already be familiar with or are willing to try to prevent experiencing stress and distress or to alleviate symptoms of stress and distress. The user begins with ‘Know your Strengths’, which helps them to identify what resources they already have to address stress and distress. Next, ‘Know your strategies’ helps to identify coping strategies that they already employ to manage stress and distress. Answers from these two sections are kept in a toolbox to remind the user of familiar tools that they are using already and options for tools they may not have used but are interested in trying. ‘Know your stressors’ and ‘Know your emotions’ are about delving deeper and identifying things that the user may not be aware are causing him/her stress and distress. This could be confronting for them, so ‘Know your village’ is a reminder of who they have around them to support them through these feelings of stress and distress.

‘Know your style’ and ‘Know your health’ are about encouraging the user to take control of their mental and physical health. These can identify negative thinking and behavioural patterns that could be contributing to feelings of stress and distress.

After identifying possible situations that could be causing stress and distress, the second module of the app, called ‘Do Something’, encourages users to address these feelings through activities such as relaxation techniques, writing in a diary or playing games. The third module, ‘Conversations,’ can also help to address stress and distress through communicating with a significant other about important aspects of birthing and parenting that the user might be finding challenging. Just the mere planning of the birth and parenting could be causing stress and communicating these concerns with a support person is another suggestion the app makes. Lastly, once the user has identified their stress and distress and begun to address it, the app provides them with links to online resources where they can read about things like stress and coping through the fourth module, ‘Find out’.

Helping teens overcome challenges during pregnancy

This study aims to identify which parts of the app are most helpful to pregnant adolescents, especially which parts of the app help teens to overcome challenges during pregnancy and to make recommendations for tailoring the app to the needs of teens. The app was developed with input from midwives and pregnant women, but has been designed and oriented toward adult women, who have different strengths, challenges, and needs than teenagers. For example, there are no

questions in the ‘Know your Stressors’ specific to adolescents such as school related stress etc. Furthermore, there is no information found in ‘Find out’ specific to teenagers. Although the app wasn’t designed for teens, there are elements that seem likely to be useful to them. These elements are also consistent with the literature on interventions for adolescents. For example, ‘Do something’ has suggestions on activities that could be useful as a distraction or coping strategy for teenagers. Suggestions for other activities and how the app might be adapted to suit teenagers and their interests, was the main aim of this study.

We know that adolescents experience pregnancy differently to older women due to developmental changes as well as changes in their cognitions and social differences (Wagner et al., 2006). Knowing this means that it is important to adapt interventions to make them more relevant to the experiences of younger mothers who may need different types of support regarding the challenges they’re facing due to their adolescent development. We also know that pregnant adolescents are at a higher risk of depression and anxiety than older mothers (Harrison et al., 2011; New Zealand Families Commission, 2011) This app is intended as a preventative measure for depression and anxiety as it can track moods, see patterns emerging, inform the user and suggest they speak to someone such as their GP. Furthermore, many of the Do Something modules, as well as the suggestions in the toolkit, for example, are activities that have been shown to improve mood—eg gratitude, strength reminders, exercise, seeking social support, etc.

Positively Pregnant is a strengths-based intervention, which empowers users to identify what skills and knowledge they already have and how they can use these to overcome challenges. Studies have shown that substance use is also

an issue with teen pregnancy (Bower, 1997; Myers et al., 2001); Positively Pregnant helps users to identify unhealthy behaviours such as substance use, unhealthy eating, smoking and suggests ways of changing these behaviours. Also of concern for pregnant adolescents is feelings of social exclusion and lack of support (Myers et al., 2001); Positively Pregnant encourages users to identify who their support group is in 'Know your Village'. In this way they are reminded of who they have around them to talk to about things.

Positively Pregnant as an intervention

Data from the 2017-2018 pilot study was used to make changes to the content and structure of the app for public release. The pilot study enrolled women who were mostly healthy and minimally stressed and distressed, and pre-post measures found no significant change on general distress measures for the group. However, there was some evidence that the small number of participants who had elevated distress showed decreased levels over the course of using the app (Carrie Cornsweet Barber, personal communication, 22 May 2019). Positively Pregnant is a holistic approach to mental health and pregnancy. As a mobile application for smartphones, it is considered an e-health intervention as it provides healthcare information. The accessible, affordable, time saving, confidential, autonomous and interactive nature of the app shows that it can be beneficial to users just as many other studies have shown that e-health interventions can be beneficial (Bruce & Kutcher, 2016; Moorhead et al., 2013; Podina et al., 2016; Sousa et al., 2014).

Addressing the limitations of e-health interventions

Quality assurance is a major part of addressing the limitations of e-health interventions. Positively Pregnant is moderated and designed by a clinical psychologist with expertise in perinatal mental health. Several focus groups have taken place with pregnant women as part of a pilot study. Feedback was given about the app and its usefulness to women during pregnancy. Feedback has been sought from subject matter experts such as midwives, counsellors and other professionals working in the field of mental, perinatal and antenatal health. This feedback has been used to adapt the information and contents of the app to suit the needs of pregnant women. Furthermore, the current study sought feedback from pregnant/parenting adolescents as well as professionals working alongside them, in order to use this feedback to adapt the app to the needs of pregnant adolescents.

Some researchers have expressed the concern that e-health interventions may not be providing reliable information to their users. By gaining feedback from parenting teenagers, we are able to understand from them what types of information they believe would have been most helpful to them during pregnancy. Moorhead et al. (2013) states that the public do not know how to apply the information they find online to their personal health situation. Positively Pregnant will use the information that the user inputs about concerns that they have about their health, and the app will assist them to manage these concerns or refer them to a source that is able to give better advice. Other aspects of the app are also able to suggest coping strategies or provide information on stress and distress and how to manage. The app is in no way aiming to diagnose and treat users, however there are measures of depression and anxiety within the app that can show a possibility of high depressive and anxious symptoms and then suggest seeking support from a GP for proper diagnosis and treatment.

To summarise, the literature has shown that there are many challenges faced by pregnant adolescents, including challenges related to their development. Pregnancy is an added stressor, and the literature has shown that stress and distress can have a negative impact on both the mother and her child. Furthermore, adolescents are still learning coping strategies and ways of dealing with stress related to their pregnancy and own wellbeing. There is very little robust research on e-health interventions for wellbeing in pregnancy, and teens in general. The current study aims to add to the development of a tool that may serve an unmet need, which is an app specifically tailored to the needs of pregnant adolescents. This study examined the challenges for pregnant adolescents, the supports that they need to manage these challenges and whether ‘Positively Pregnant’ meets the needs of pregnant adolescents. Furthermore, participants in this study were asked to provide suggestions for how the app can be tailored to the needs of pregnant adolescents. This study aims to fill the gap between pregnancy apps such as ‘Positively Pregnant’ and other apps designed for adolescents to develop a tool which provides support for pregnant adolescents.

Chapter 2: Methods

This was a qualitative study which included feedback from pregnant and or parenting adolescent women during one on one feedback sessions. During these sessions, women were asked about their opinion on whether this app would be helpful for pregnant teenagers based on a 'guided tour' of the 'Positively Pregnant' app. Professionals working alongside pregnant and/or parenting teens were also asked for their opinion on the types of support needed and whether this app provided this.

The researcher

It is important as a researcher to be aware of and acknowledge personal beliefs and assumptions, and how these might influence the research itself. I am a single 24-year-old female with no children. I have seen several of my cousins become teen mothers, and the challenges that they faced as a result. I also have personal experience with mental health and was undiagnosed until I was an adult. I feel that I would have greatly benefitted from a mental health intervention as a teenager but did not know that they existed. Furthermore, my mother was under tremendous stress both physically and mentally while she was pregnant with both my brother and I; since studying psychology I have wondered if that stress during her pregnancy has contributed to both my brother and I struggling with our mental health. I am aware that these experiences have been the catalyst for pursuing this research topic and may have an influence on my perspectives of pregnancy and mental health.

Recruitment

With the help of the other members of ‘Positively Pregnant App’ and the head supervisor, participants were recruited from the Bay of Plenty and Waikato region. The participants were invited to take part in the research through Posters (Appendix A), Emails (Appendix B), and letters (Appendix C). A list of all services/pages contacted is provided in Appendix F.

Inclusion Criteria

The inclusion criteria for participating in this research was that 1) The participant be between 16-20 years old, or they were a professional working with this age group 2) The teen participant be pregnant or parenting. The app was described as a tool for managing stress and distress, however there was no inclusion or exclusion based on these factors. Thus, any pregnant and/or parenting adolescents who were interested in participating in this research were welcomed.

Details of recruitment and enrolment

Original Study

The original plan for the study was to conduct a small pilot similar to the larger pilot study in which pregnant teens would complete initial measures of their wellbeing, use the app and give feedback on its usefulness, and provide repeated measures of their wellbeing and use and satisfaction with the app. Specifically, participants were asked to take part in 3 feedback sessions; 1 month after the first meeting, then 1 month after that, and finally 1 month after giving birth to baby. During these feedback sessions they would be asked to complete a questionnaire.

Several methods were tried to recruit participants, beginning with recruiting from a Teen Pregnancy Unit in Hamilton. A letter was written to the principal of the school (Appendix C). Upon speaking with the students, there were issues involving gaining parental consent, as they were under 16. This resulted in the researcher losing contact with the students after first meeting with them. Furthermore, participants were asked to take part in the study for 3 months, however all potential participants were too far along in their pregnancy to take part.

Attempts were then made to recruit through five other TPU units in NZ, starting with attending a meeting of unit directors, where five expressed interest. However, only two responded to subsequent emails. Additionally, attempts were made to recruit participants from the wider community through social media, youth health centres, and announcements to midwives, but no pregnant teens were recruited for the study initially.

Revised Study

As time constraints added further pressure to recruitment, the decision was made to recruit parenting teens, as well as professionals that worked with them. Participants under 16 were recruited due to the difficulties experienced in obtaining consent from parents in the original study.

Emails were sent to various parenting and youth support services (listed in Appendix F) requesting parenting teenagers and professionals who work alongside them to take part. The supervisor of this project also sent emails to midwives, educators and mental health professionals.

Secondly, a poster was disseminated through social media, email and during conferences attended by members of the research team. Two separate posters were

made, one for professionals and the other for adolescent participants (Appendix A).

Thirdly, this researcher contacted the administrators of community pages on Facebook and asked them to share the poster on their pages (listed in Appendix F)

Two enrolment methods were used in this study: a) face to face meetings and b) email conversations. Each participant was provided information about the study and given a consent form to sign before giving feedback.

Due to time constraints and difficulties in recruitment, participants were not asked to complete questionnaires and only took part in one interview/feedback session.

Demographic Characteristics of Participants

Interviews were done with five participants; three professionals and two adolescents. Each professional has worked alongside pregnant adolescents throughout their careers; a Māori European counsellor specialising in adolescent mental health, a Māori European midwife who worked mostly with adolescents and, a teacher at a high school teen parent unit (unknown ethnicity). One adolescent was pregnant and the other was parenting. The pregnant teenager was a Māori 17-year-old who was a student at a high school teen parent unit. She also had a baby that was 1 year old. The parenting teenager had recently given birth; she was a NZ European 18-year-old in her final year at a high school teen parent unit. There were also 2 other teenagers that completed the consent process however, dropped out before giving feedback. Drop-out was due to loss of contact between the researcher and the participants.

Ethical Considerations

The materials and procedures used in this study were reviewed and approved by the School of Psychology Human Research Ethics Committee at the University of Waikato (#17:01) along with several amendments. Several ethical considerations are described below.

Participants gave informed consent at the time of recruitment. They were first given an information sheet, describing the app and outlining the procedure of the study. The researcher was available to answer any questions that they had. They were given a copy of the consent form once signed and the main copy kept for research records.

To ensure the privacy and confidentiality of participants, unique numbers (i.e. 601) were assigned to each participant. Participants' names were only recorded on their consent forms. Notes from interviews were typed and stored electronically, without identifying information. Only the researcher and the supervisor had access to participants' names.

Consideration of social and cultural responsiveness was an integral part of the research project and app. Although several participants in this study identified as being Maori, their ethnicity did not factor into any part of their feedback during their interviews. Nevertheless, attempts were made to acknowledge their Maori heritage by talking about my own Maori heritage when introducing the study. This study also focussed on social responsiveness in terms of soliciting feedback from teen mothers and professionals who have knowledge of the needs of this group. Interviews and enrolment sessions were held when and where participants felt comfortable and were easily accessible.

Participants were asked on their consent forms if they wanted to receive a copy of findings from the research. They could choose to tick the box beside ‘I wish to receive a copy of the findings’ and they were sent the findings of the study as an acknowledgment of their valuable contribution to the study.

Procedures

Feedback sessions

Feedback sessions took place in two forms; in person and over email. The pregnant adolescent was interviewed at her TPU, the parenting adolescent at her home, the midwife in her office, the counsellor at the researcher’s home and the TPU teacher over email.

The researcher begun the feedback sessions by asking participants about the challenges and needs of pregnant adolescents. After that, participants were given a guided tour of the app and then asked for feedback from their impressions of that. The researcher’s personal lap top was used to show a slideshow that described the app in detail. The slideshow (Appendix H) consisted of screenshots of the app and the four modules. The parenting teen had already used PP on her phone during her pregnancy however she was still given a guided tour using the slideshow. The email feedback procedure was slightly different in that the participant downloaded the app on her own phone as well as looked at the slideshow in her own time, and then gave feedback. Afterwards she was asked about the challenges and needs of pregnant teens.

Each interview/feedback session was structured with specific questions related to the four research questions: 1. What are some of the challenges for pregnant adolescents, 2. What types of support do they need to manage these

challenges, 3. Does the 'Positively Pregnant' app provide the support that pregnant adolescents need, 4. What suggestions are there for tailoring the 'Positively Pregnant' app to pregnant adolescents needs. Suggestions were about the app as well as each of the four modules.

During these feedback sessions, detailed notes were taken by the researcher which were then typed on to the researcher's personal computer. Feedback sessions were not recorded and transcribed.

Data Analysis

Data derived from interviews with participants was analysed using thematic analysis. There are several reasons behind this method of analysis for this study such as: its simplistic yet diverse approach to analysing data, sample size and flexibility. Thematic analysis can be applied in many ways, to various data sets, to address different types of research questions. It can provide a rich and detailed account of the data (Braun & Clarke, 2006). This can also be useful when analysing data from a small sample of data, such as the five interviews in the current study.

Thematic analysis is used to identify, analyse and report patterns with data. It also describes the data in rich detail (Braun & Clarke, 2006). Following Braun and Clarke (2006) six step guide, themes were identified using an inductive semantic approach. First, I read and re read the data from each interview noting any key ideas that stood out. Secondly, I created some initial codes derived from these key ideas. Next, I began to identify themes, common statements or perspectives found in the previous steps. The fourth step was to review these

themes; creating a thematic map helped to refine the themes and create clear concise names for them. Sub-themes helped to give further insight. Defining and naming the themes was part of the fifth step. Lastly, using extracts from interviews, I related the themes back to the research questions and literature.

Chapter 3: Results

In analysing the interview data, several important themes emerged for the challenges and needs of pregnant teens as well as participants' feedback about 'Positively Pregnant' and how it could be tailored to meet these needs. Each theme is explored in detail along with extracts from the interviews with the participants.

Challenges and needs of pregnant teens

Participants were asked their opinion on what challenges there are for pregnant teens and what types of support they need. Three themes emerged from the data analysis: Emotional wellbeing and support, Access to resources, and Cognitive immaturity. Extracts from interviews with participants are provided.

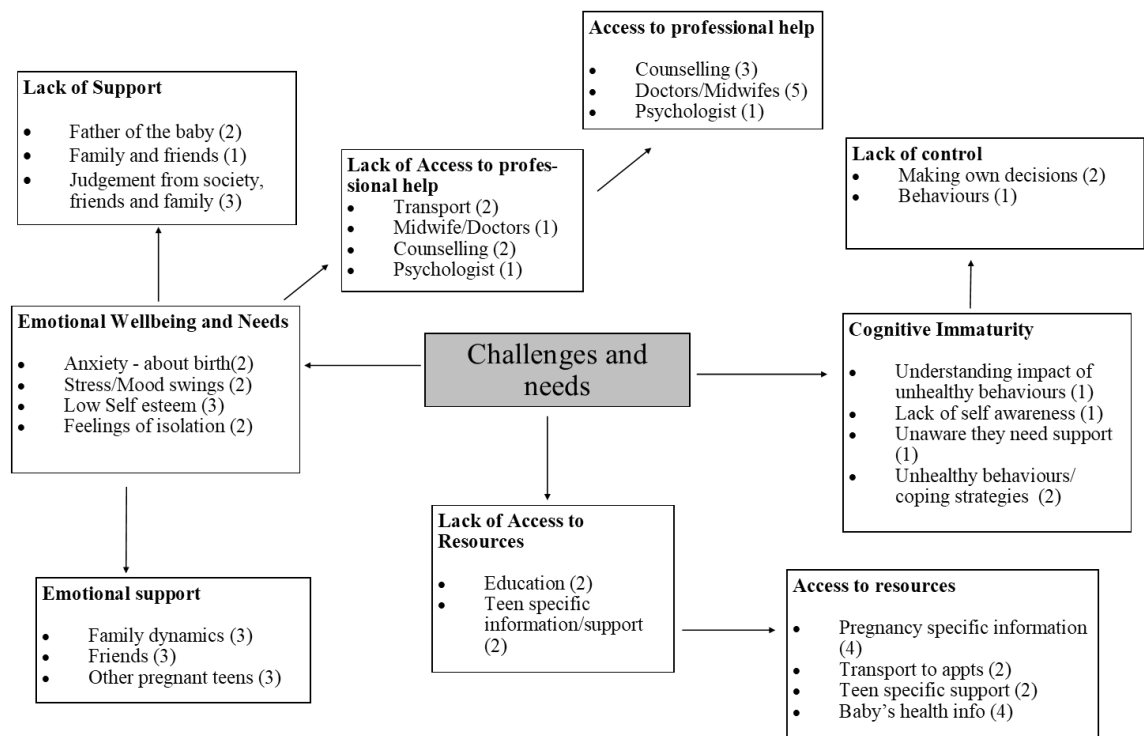


Table 1. Thematic Map: Challenges and needs of pregnant teens

Emotional wellbeing and support

Four out of the five participants spoke about issues related to pregnant adolescents' emotional wellbeing. This included having low self-esteem which the Midwife participant suggested, is often associated with relationship problems and a perceived inability to parent. Furthermore, the Pregnant Teen participant reported that feelings of unattractiveness due to body changes and hormones also had an effect on self-esteem. A lack of support from family, friends, healthcare professionals and their community were also issues raised by some of the participants. Therefore, both the Pregnant Teen and Midwife suggested that pregnant teens need support from these people, especially professionals such as counsellors, midwives and GP's. Indirectly these supports are closely related to the challenges that pregnant teens face.

Firstly, adolescents may experience feelings of anger, shame and fear. Both adolescent participants expressed a fear of birth and the pain that they might experience. Shame was also related to fear of judgement from those around them. The counsellor suggested that fear and shame might manifest itself in terms of adolescents using maladaptive coping strategies such as:

I did this to myself, I have to deal with the consequences - Counsellor

Participants stated that lack of support, real or imagined, can also elicit feelings of shame. This includes a fear of judgment and sometimes experiencing judgement from society as well as those closest to them. Both adolescent participants spoke about their personal experiences of this:

People staring at me because I am a pregnant teenager... not wanting to go out in public because of it – Pregnant Teen

Weird looks when you're out in public... people saying 'couldn't you wait... family and friends behind your back – Parenting Teen

Two of the participants spoke about how pregnant adolescents have difficulties in their relationships. For example, issues with their partner/father of the baby being unfaithful [Midwife] and unsupportive of the pregnancy [TPU Teacher]. Furthermore, the counsellor spoke about family dynamics, that adolescents fear judgement from their family as well as fearing lack of support. Both adolescent participants reported that they felt they had their family's support but not their friends. Pregnant adolescents' friendships can become a challenge to maintain during pregnancy because priorities change:

They want to party, but you can't because you're pregnant, and even after you have the baby they promise to keep in touch but don't... all the attention is on baby...I can't go anywhere without taking her with me – Parenting Teen

All five participants agreed that pregnant adolescents must have access to a doctor and/or midwife during their pregnancy. Furthermore, the Counsellor suggested that adolescents want access to a counsellor or someone they can talk to about what is going on for them, someone who can provide mediation between the pregnant teen and her family to help with communication and relationship building. Furthermore, the Midwife suggested that it is important for pregnant teens to have a support person to talk to and ask questions that they don't feel comfortable asking their midwife/family/healthcare provider about.

Having a supportive midwife who has an affinity with pregnant teens is useful as the teens rely a lot on their midwife for support – TPU Teacher

Four participants mentioned that pregnant adolescents need emotional support from their family and friends as well as other pregnant or parenting teenagers. Their family can provide advice and reassurance [Midwife & Pregnant Teen] and they can also receive support from other mothers such as exchanging parenting tips [Parenting Teen]

My mum tells me that my body will go back to normal after I have baby. She says stretch marks are beautiful because it's a mark that baby gave me – Pregnant teen

Access to resources

Access to resources or lack thereof is another challenge that the participants believe pregnant adolescents struggle with. Four of the five participants mentioned that accessing professional help such as a midwife, counsellor, and psychologist can be a challenge for pregnant adolescents. Transport to appointments is also a highlighted issue for pregnant adolescents. Two of the professionals discussed the difficulty that some pregnant teens have in attending appointments, mostly because of transport issues.

Some cannot drive. Getting to appointments is difficult for them. Some also cannot afford to use public transport – Midwife

The Midwife commented that some pregnant adolescents do not know how to access services and are often unaware of what types of supports there are out there for them as well as how to contact them. The Pregnant Teen suggested that there needs to be easier access to supports such as free healthcare and transport to appointments.

Lack of teen-specific information/support was highlighted as a challenge for pregnant adolescents. Both of the adolescent participants spoke about how as students at their local high school TPU, they were supported to gain an education as well as manage their pregnancy with the support of their peers and professionals. They both also admitted that this was not the case for every pregnant adolescent in New Zealand. Education can be a challenge for pregnant adolescents if they're experiencing things like morning sickness and fatigue. Both adolescents spoke about how difficult it can be some days to go to school whilst being pregnant. But on the flipside, they spoke about the support they each had gotten from their teachers and peers.

Most of the participants felt that it is important for pregnant adolescents to be able to access different resources such as: pregnancy specific information, transport to appointments, teen specific support, and baby's health information. Extracts from interviews with participants grant further insight into the types of information and resources pregnant adolescents need.

...information to take away about changes to their body. This allows them to learn things at their own pace – Counsellor

Pregnancy related questions such as: what is normal in terms of body changes, baby's movements, mood changes, and hormones. Information places and screening websites are also helpful – Midwife

An app that shows the size of baby and the baby's normal progress – what is expected at each trimester in terms of health and growth. Any information about baby's health and what is normal. Teen specific support

as well, like a teen pregnancy unit where there are other pregnant teenagers – Pregnant Teen

...antenatal classes that have been provided just for teenage mums, so they can be around others their own age, where they feel comfortable asking any questions... mainstream classes learning about labour and birth, and from Māori centred classes where our Māori students can learn more about the spiritual aspects of giving birth, and a different way of viewing pregnancy and birth – TPU Teacher

Cognitive immaturity

The third theme that emerged refers to the ability of pregnant adolescents to understand their situation. Below are some extracts from interviews with two professionals and their perspectives on this matter. This theme was not evident in the interviews with the pregnant adolescents; however, it is worth discussing in the next discussion as to why that might be.

Confusion about body changes – being reliant on others to help them make sense of these changes... They don't understand the gravity of their situation – being pregnant and becoming a parent... Teenagers are not cognitively mature enough to understand what is happening to their bodies, and they sometimes do not recognise that they need support – Counsellor.

“...Not fully understanding the impact of unhealthy life choices on the baby... living in environments that aren't healthy for self and baby (smoking, drugs, alcohol, family violence, poor housing, and food consisting mainly of takeaways) – TPU Teacher

Both above examples show that two of the professionals suggest that pregnant adolescents lack self-awareness. Specifically, they lack the self-awareness to understand their situation and in turn do not recognise that they may need help or support to cope with their situation.

Two of the professionals suggested that pregnant adolescents lack control over their pregnancy. More specifically, they lack control over their bodies, they're told what to do, what to wear, and what to eat during their pregnancy [Counsellor]. The TPU teacher stated that pregnant adolescents are not treated respectfully and given real choices during their pregnancy. Neither of the adolescent participants mentioned feeling like they were not in control of their bodies and their pregnancy.

‘Positively Pregnant’ app – Feedback and Suggestions

Participants were given a guided tour of ‘Positively Pregnant’ (PP) and then asked about their impressions of the app from that. They were then asked to provide suggestions for how the app could be tailored to meet the needs of pregnant adolescents.

Participant feedback was categorised into negative feedback, positive feedback and suggestions for improvements. These comments are described below.

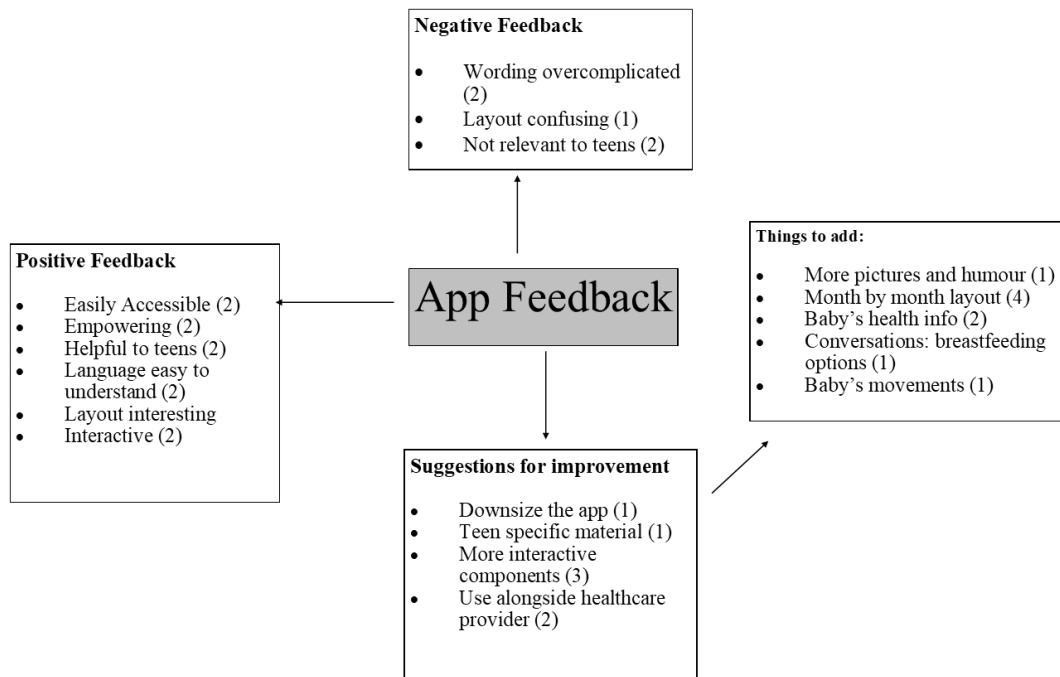


Table 2. Thematic Map: App Feedback

Negative feedback

All three professionals felt that the app as a whole could be quite overwhelming for teenagers. This was their reasoning:

Wording is not very easy to understand. Wording may be intimidating for teens (in relation to find out) – Midwife

I felt for older more mature Mums it could be really useful, however for our teen Mums it wasn't really in their language or style – TPU Teacher

The app overall is A LOT... are teenagers self-aware enough to use this app; do they have the emotional maturity to think that deeply about themselves. I don't think the app is applicable to teens; it is too overwhelming. The wording is over-complicated and not using their jargon (in relation to the app overall). They are in a dream state – not self-aware enough to think about all of these topics (in relation to

conversations module). *They would be swamped and overwhelmed* (in relation to find out) – Counsellor

Neither of the adolescent participants had any negative feedback.

Positive feedback

Four of the five participants gave positive feedback, including that PP was:

Easily accessible - in terms of how easily it could be downloaded and then used.

I like that it doesn't have any ads popping up while you're trying to use it–

Pregnant Teen

It's good that there is no need for data or wifi – apart from the online resources – Midwife

Empowering for pregnant women – in terms of the many different kinds of support and information it provides.

Power is given back to them – allows them to take charge of their pregnancy. Great for self-care (in regard to 'Do something' module) – Counsellor

I like that there is heaps of support and information all in one app... it's just for me and it gives me feedback about what I say – Pregnant Teen

Both of the adolescent participants believed that this app would be easy to use and helpful for pregnant teenagers however, the professionals did not. Both adolescent participants commented that the language was easy to understand, and they found the layout and style of the app interesting. The Counsellor and Parenting Teen reported that the 'Conversations' module would be most helpful to pregnant

teenagers. The Midwife and the Pregnant Teen felt that the ‘Find Out’ module would be.

Interactive – Participants liked the interactive nature of the app, the self-assessments and activities. Both adolescent participants felt that they would use the “Know Yourself” and “Do Something” modules the most.

I think the ‘know your emotions’ looks really interesting...I like the parts of the app that were interactive and gave me feedback... ‘Guided activity’ would be my favourite because it says what to do to try and relax when I’m stressed or anxious – Pregnant Teen

Teenagers are doers rather than talkers.... tracking of moods is really good- Counsellor

Suggestions for improvement

Four of the five participants gave suggestions on how to tailor Positively Pregnant to the needs of pregnant adolescents. These included: downsizing the app, adding teen specific material, use alongside healthcare provider and, things to add.

The Counsellor suggested downsizing the app, or even creating a separate version that’s lighter. Furthermore, the TPU Teacher responded that the app needs to be more relevant to teenagers, with teen specific information:

Most don’t even read magazine articles and would need something I think really interactive with lots of pictures, perhaps even humour, related to things they’re into – TPU Teacher

Two of the participants suggested that the app should be used alongside a healthcare provider, someone with knowledge of pregnancy and adolescent mental health. Furthermore, two of the professionals suggest that healthcare providers could use the app as a tool with their clients during appointments:

Not sure without guided support from a knowledgeable person, like a counsellor, if teens could use this app. I would use this as a tool with my clients – Counsellor

Good to have a prompt for them to think about what to discuss during appointments – questions that may be raised whilst using the app that they want to discuss with their midwife/doctor – Midwife

Only two of the participants gave suggestions for things that could be added to the app. These suggestions were not related to adolescence but rather pregnancy.

Know Yourself

Who can take them to their appointments in 'Know my Village' and Baby's movements in 'Know my health' – Midwife

Do Something

Physical activities appear to be good for mental health, but maybe not enough emphasis is placed on physical health for mum and baby. Maybe make it clearer that these activities will benefit baby – Midwife

Conversations

Things to talk to Midwife about? Possibly a space for them to write these things – Midwife

Breastfeeding options – what to do if mum can't breastfeed, what formula will we use – Parenting Teen

Find out

What's normal? links to screening websites, online resources that are relevant to their pregnancy trimester – have these resources in order so that it is clearer when during their pregnancy this information would be relevant and helpful – Midwife

What to expect when giving birth – Parenting Teen

Summary of Results

Three key themes emerged for the challenges and needs of pregnant adolescents. The first theme was Emotional wellbeing and support; pregnant teenagers experience issues with their emotional wellbeing, and lack support from their family, friends, healthcare providers and their community. Furthermore, pregnant adolescents need more access to both professional and emotional support. The second theme was Access to resources; this highlighted both the challenges and needs of pregnant adolescents in terms of transport, teen specific support, pregnancy specific information/support and baby's health information. The third theme was Cognitive immaturity and pregnant adolescents' ability to understand their situation and make decisions about their health and pregnancy.

Feedback on the 'Positively Pregnant' app provided three types of information: Negative feedback, Positive feedback and, Suggestions for improvement. All three professionals commented that the app would be overwhelming and not suited to adolescents. The adolescent participants did not

express this concern. Four of the five participants gave positive feedback including that it was easily accessible, empowering, easy to use and helpful to teens. Lastly, participants suggested downsizing the app, adding teen specific material, using the app alongside a healthcare provider and then suggested some add-ons.

Chapter 4: Discussion

The current study has examined teenage pregnancy: the challenges faced and the different needs of pregnant teens, especially in relation to the ‘Positively Pregnant’ app. This chapter will discuss the research findings, their implications for the tailoring of this app to the needs of pregnant teenagers, some strengths and limitations of this study, and direction for future research.

Challenges and needs of pregnant teens

Three themes emerged from the data analysis: Emotional wellbeing and support, Access to resources, Cognitive immaturity. According to the professionals who work with them, pregnant adolescents experience anxiety, mood swings, low self-esteem and, feelings of isolation. Both adolescent participants spoke about feeling anxious about giving birth, specifically fearing the pain of birth. Similarly, de Anda et al. (1992) identified pregnancy and delivery as a major source of stress for pregnant adolescents in their study.

In the current study, when asked about what types of support pregnant adolescents needed, the Parenting Teen suggested being provided with information about what to expect when giving birth. She suggested this be added to the ‘Positively Pregnant’ app in the ‘Find Out’ module. Both adolescent participants said they struggled with mood swings and felt stressed because of their hormones. Several studies have discussed the many changes that occur during adolescence, including hormones, and often adolescents will experience high levels of stress related to these changes (Gramling et al., 1998; Letourneau et

al., 2004). Pregnancy is an added stressor, and further changes to their body and hormones occur (Letourneau et al., 2004).

Three of the participants in this study believed that low self-esteem can also be a challenge for pregnant adolescents. The Midwife stated this could be particularly related to a perceived inability to parent as well as relationship problems. There is sufficient evidence from other studies that relationship instability is often a challenge for pregnant adolescents and this can also be a risk factor for subsequent pregnancies (Kessler et al., 1997). The Parenting Teen mentioned in her interview that she believed subsequent pregnancy is common within her peer group of adolescents. The Pregnant Teen also spoke about “not feeling attractive” and how her mother helped her to understand the changes happening to her body by making them a positive thing; “stretch marks are beautiful”.

Support from family appeared to be extremely important to both adolescent participants and has also been shown to be a mediator for perceived stress and distress during pregnancy (Barth, Schinke, & Maxwell, 1983). Furthermore, adolescent mothers experiencing high levels of stress report negative body image, and a high level of isolation (Loya-Jimenez et al., 2014). Although that study is about parenting adolescents it is still relevant to this discussion because the pregnant teen is also a mother and spoke about experiencing stressful situations in regard to her home life. A large body of research has suggested the negative impact that stress and anxiety has on both the mother and baby; such as preterm delivery and low birth weight (Berle et al., 2005; Lobel et al., 2008; Woods, Melville, Guo, Fan, & Gavin, 2010), as well as other psychological, cognitive and behavioural issues for both mother and child (Siegel & Brandon,

2014; Weinberg & Tronick, 1998). The experiences highlighted by the participants in this study appear to be like those reported in the literature, suggesting that this is one area of teen pregnancy that interventions could be focussing on.

Access to resources is the second theme identified for challenges that pregnant adolescents experience. The first challenge being that there is a lack of access to resources such as teen specific information and support such as education and support with their pregnancy. A large body of evidence suggests that teenage motherhood is often associated with minimal education and therefore very poor employment prospects (Letourneau et al., 2004; New Zealand Families Commision, 2011; Quinlivan, 2016). Both adolescent participants are students at a high school unit for pregnant and parenting teens. Here they are supported to gain an education whilst also being provided with the support they need to manage their pregnancy. These Teen Parent Units (TPU) follow the same curriculum as the high schools they are situated in and the students in these TPU are still encouraged to participate in school events and activities. This way they are still socialising with others their age. The TPU Teacher commented that in addition to getting support with their education, these young women are also provided with pregnancy-specific programmes such as antenatal classes and mainstream classes about labour and birth. This appears to be an extremely positive and helpful resource for the two adolescent participants. Unfortunately, this is not the experience of all pregnant teens. The Midwife in this study suggests that some pregnant adolescents might not even be aware of what types of services and resources there are out there for them, let alone how to contact and then use them.

Similarly, access to professional help was noted as a challenge for pregnant adolescents; they struggle with access to counselling or finding transport to appointments with their midwife or doctor. Again, the issue some of the time may be that pregnant teens don't know how to get in contact with services such as a midwife. According to the Counsellor in this study, "proximity is a huge factor – not sure how to access help". Difficulty accessing healthcare has also been highlighted by the New Zealand Families Commission; affordability is an issue for pregnant teenagers, they may not be able to afford to see a healthcare professional (New Zealand Families Commission, 2011). This is why E-health interventions are becoming more popular, because they are more widely available, more affordable and time saving than classic interventions such as counselling and healthcare professionals (Bruce & Kutcher, 2016; Podina et al., 2016). This is not to suggest that e-health interventions should be a replacement for health care professionals.

Transport to appointments was highlighted as an issue by two of the participants. As the midwife in this study stated "Some cannot drive. Getting to appointments is difficult for them. Some also cannot afford to use public transport". A pattern seems to be emerging in the literature; pregnant adolescents find it challenging to get an education and thus are leaving school early and struggling to find employment. Without any income they are unable to access the kinds of supports they need such as midwife and doctor appointments as well as counselling and other services that may be beneficial to them. On the flipside, two participants in the current study suggest that pregnant teenagers don't actually realise that they need support [Counsellor and TPU teacher] and this could be due to the following theme.

The third theme is about the ‘Cognitive immaturity’ of pregnant adolescents. This is a challenge for them because at this stage of their development, they are still learning about themselves. Adolescence is the time in their lives when they are developing their sense of identity (de Anda et al., 1992; Lieberman et al., 2014). Changes are happening: social, psychological and physical changes (Wagner et al., 2006) and they also learn healthy coping strategies for managing the stressors in their lives (Gramling et al., 1998). Pregnancy can be an additional stressor during adolescence because the expected level of maturity may exceed their capabilities and they are now responsible for both theirs and their child’s wellbeing (de Anda et al., 1992; Lieberman et al., 2014).

The findings from the current study are that pregnant adolescents may find it difficult to understand their situation and how to manage it. They are “...reliant on others to help make sense of these (body) changes” [Counsellor] just as the Pregnant Teen said that her mum helped her to understand the changes happening to her body. Furthermore, the Counsellor commented that “They don’t understand the gravity of their situation – being pregnant and becoming a parent” . When it comes to coping strategies, the Counsellor in our study suggested that pregnant adolescents are likely to use optimistic coping strategies i.e.: “she’ll be right”, “dream state”. Similarly, Myers et al. (2001) found that pregnant adolescents are more likely to use emotion focussed strategies such as “optimism, wishful thinking, or daydreaming and seeking social support” (p.26). The TPU teacher in the current study suggested that pregnant adolescents do not fully understand the “impact of unhealthy life choices on the baby” including “living in environments that aren’t healthy” for herself or the baby, these include “smoking, drugs,

alcohol, family violence, poor housing, and food consisting mainly of takeaways”.

This is concerning because this type of unhealthy behaviours and environments

can be harmful to both the mother and child and can also have negative birth

outcomes. Two recent studies have shown that cigarette smoking during

pregnancy can predict low birth weight (Berle et al., 2005; Lobel et al., 2008).

Women in one these studies reported that cigarette smoking and unhealthy eating

was part of their coping strategies to deal with stress during their pregnancy

(Lobel et al., 2008).

Lack of control is another concern for pregnant adolescents. For example,

the Counsellor commented that they experience a “lack of control over their

bodies – being told what to do, what to wear, and what to eat during pregnancy”.

Furthermore, the TPU Teacher responded that pregnant adolescents are not being

treated respectfully or given real choices about their pregnancy journey. Similarly

de Anda et al. (1992) found that the expectations of acting like an adult and being

treated like a child was a major source of stress for pregnant adolescents in their

study. The ‘Positively Pregnant’ app has a section in the ‘Know Yourself’ module

called ‘Know your styles’, this is about the user’s locus of control and desire for

control. It encourages the user to think about how much control they have over

their decisions and behaviours and, how much control they would like to have

over these things. The counsellor in this study believes that this aspect of the app

“gives power back” to the pregnant teen. Furthermore, ‘Know your health’ also

encourages the user to take control of their mental and physical health. The app

also helps to identify negative thinking and behavioural patterns and then provides

a second module called ‘Do Something’ which encourages the user to address

these behaviours and thought patterns.

Support appears to be a recurrent theme in the literature, and possibly the most important aspect of ensuring the wellbeing of the pregnant adolescent and her baby. However, it is evident in the findings of this study that lack of support is a very real challenge for some pregnant adolescents. According to the findings of this study, pregnant adolescents fear judgement from society as well as from those closest to them like their family and friends. This often also causes feelings of isolation, not wanting to go out in public because of “people staring at me because I am a pregnant teenager” [Pregnant Teen] as well as getting “weird looks” and people making comments like “couldn’t you wait” [Parenting Teen]. Sometimes these comments are made by family and friends “behind your back” [Parenting Teen]. There can also be relationship difficulties, especially with the father of the baby “who may or may not be supportive” [TPU teacher] or there could be issues like “STI and unfaithfulness” [Midwife]. Relationship instability can be a contributing factor to subsequent pregnancies (Kessler et al., 1997). According to de Anda et al. (1992), the unborn baby’s father is perceived to be the individual which caused the most stress however, the members of the pregnant adolescents’ immediate family caused stress for very few respondents. Pregnancy during adolescence can also impact on family dynamics as, although “most of the time the families are supportive...there is still that fear that they won’t be” [Counsellor]. Family dynamics is an integral part in how the adolescent mother perceives her ability to cope with stressful situations (Barth et al., 1983). Lastly, lack of support from friends was experienced by one of the participants in this study, and she believes that this could be a common challenge for pregnant adolescents. For example, she talked about how “They (her friends) want to party but you (pregnant adolescent) can’t because your pregnant.... they promise to keep

in touch but don't" [Parenting Teen]. Being pregnant for this teen meant she couldn't go and drink with her friends, and they didn't make the effort to spend time with her doing things that were appropriate for her during her pregnancy. According to research done by Humberstone (2018) into social networks and educational attainment among pregnant adolescents, if the teen believes she has ongoing friendships, this may buffer feelings of stress, isolation or judgement. Support from family and friends, appears to be an integral part of maintaining the wellbeing of pregnant adolescents.

Participants were asked about the needs of pregnant adolescents, and these were often related to overcoming the challenges they had mentioned. These included access to professional help, access to resources and emotional support.

Some of the participants mentioned the need for support with accessing different services such as counselling and healthcare. Luckily for the two teen participants, they both have support from their TPU to access free healthcare as well as other services such as counselling. Both the Counsellor and Midwife responded that counselling can provide pregnant adolescents with someone to talk to about what's going on for them as well as providing answers to questions teenagers might not feel comfortable talking to their midwife/family or healthcare provider about. A professional with knowledge about pregnancy and adolescence as well as mental and physical health can address some of the challenges that pregnant adolescents experience. E-health interventions may be a good alternative to traditional health interventions, as they enable clients to not have to pay to go to appointments over small problems and this is also less time consuming for their provider (Kauer et al., 2012). The literature does not suggest that e-health interventions completely replace face to face interventions as there are limitations

of e-health interventions. One in particular is, there is limited ability to identify at risk patients and treat them accordingly (Ebert et al., 2018). Of course, there are also things like needing regular check-ups, scans and blood tests during pregnancy that have to be performed by an actual medical professional. However, in terms of providing information and support that might prompt users to seek professional help, e-health interventions can be beneficial.

The ‘Positively Pregnant’ app has a link to a ‘Find your midwife tool’. This tool addresses another challenge suggested by the participants in this study, one of not knowing how to access services or professional help [Midwife and Counsellor]. The app’s aim is to not only provide information and tools for the user but to also connect the user with local services that are dedicated to pregnancy and parenthood. Furthermore, having different tools such as guided activities for relaxation and stress management, as well as a mood tracker, and access to information and resources may reduce the need for professional help. Further research is suggested here in terms of how much professional intervention is needed when an e-health intervention such as ‘Positively Pregnant’ can provide so many different kinds of support.

Access to resources was another suggested support for pregnant adolescents. Participants felt that many adolescents would benefit from resources and information about “what is normal” [Pregnant Teen, Parenting Teen and Midwife] such as body changes, baby’s movements, health and growth [Counsellor and Pregnant Teen]. Furthermore, participants felt that ‘teen specific support’ would be beneficial such as having other pregnant teenagers around them in a supportive environment like a TPU or teen specific antenatal class. Kauppi and Garg (2008) studied a peer mediated support group for young mothers which

empowered women to educate themselves on healthy pregnancy and parenting behaviours through links to online resources and information. They found that the programme provided peer support as well as helpful resources which helped users to overcome challenges and learn valuable life skills (Kauppi & Garg, 2008). The implications of this finding are that in addition to face to face peer support, online peer support could also be a positive option for pregnant adolescents.

The Pregnant Teen in the current study specifically mentioned wanting “an app that shows the size of baby and the baby’s normal progress”; the ‘Positively Pregnant’ app features a piece of fruit that represents the size the baby might be as it grows. This gives the user a rough idea of what size the baby would be, however it does not go into too much detail about the expected growth and health of the baby at each trimester. The TPU Teacher stated that her students have benefitted from classes about labour and birth as well as Māori centred classes where students can learn about the spiritual aspects of giving birth as well as ways of viewing pregnancy and birth.

‘Positively Pregnant’ encourages the user to think and discuss these topics with their partner and/or support people in the ‘Conversations’ module. For example, “Birth Hopes and Plans’ encourages the user to think about and discuss her expectations, thoughts, fears and hopes for the birth. ‘Weaving Traditions Your Way’ is helping the user to consider the cultural and traditional aspects they want to bring into their child’s life right from birth. The ‘Positively Pregnant’ app also provides the user with links to quality resources and information in the ‘Find Out’ module. For example, there is pregnancy specific information such as ‘Your Pregnant Body’ which is about helping the user to understand what is happening

to their body, and how to manage other people's opinions of their pregnancy journey.

The theme of Lack of control is relevant here because pregnant adolescents are told what to do, what to wear and what to eat during their pregnancy [Counsellor]. This specific section of the app encourages the user to take back the control – “you are the one in charge of your body”, stating also that the best person to ask for advice on their pregnancy and baby's health, is their LMC or midwife. There are also sections in the app about how to manage wellbeing, relationships, finances, cultural and traditional differences, as well as spirituality and faith. Furthermore, there are online resources which take the user to websites devoted to pregnancy and birth. The ‘Positively Pregnant’ app is unique in this way because it is taking a holistic approach to pregnancy and the information it is providing to the user.

Emotional support is the third theme identified for this section of the current study. Participants responded that they felt that pregnant teenagers need support from their family and friends as well as other pregnant and/or parenting teenagers. So far, participants have identified that having access to professional help as well as resources and information about pregnancy, is needed to support pregnant adolescents to manage the challenges related to being pregnant. Having the emotional support from those closest to them means that they are being supported to manage challenges in their daily lives. For example, their family can give them advice [Midwife] and reassurance [Pregnant Teen]. Furthermore, support from other pregnant adolescents in antenatal classes gives them the opportunity to talk to others their age and feel comfortable asking questions [TPU Teacher].

‘Positively Pregnant’ has a section called ‘Know your Village’ in the ‘Know Yourself’ module; in this module, the user can input who in their lives can support them with various aspects of their daily lives as well as their pregnancy. For example, who they can go to for advice, who will help out when they’re feeling overwhelmed, and who they can rely on for fun, for a laugh and a good time. Social support has been found to be a moderator for stress and distress in pregnant women (Cox et al., 2008; Hobel et al., 2008). Similarly, adolescent mothers who reported high levels of social support also reported lower stress levels (Colletta & Gregg, 1981). In a study of social networking sites Nolan et al. (2015) found that emotional support increased parental confidence, and reduced parental stress with adolescent mothers. Instrumental support, which is the offering of private and personal support, was also often provided by friends and family (Nolan et al., 2015). Another study found that online support groups for pregnant adolescents can provide emotional, instrumental and informational support, and regular use of one particular forum was found to reduce parenting stress (Dunham et al., 1998). To summarise, findings from the current study suggest that emotional support is important to maintaining the wellbeing of pregnant adolescents, which is supported by past research about the positive effect of social, emotional and instrumental support for both pregnant and parenting adolescents. The implications of the findings in past research could be that e-health interventions such as ‘Positively Pregnant’ are able to provide a range of supports to pregnant adolescents that are easily accessible, cost effective and relevant to them and their situation. There is little evidence of there being efficacious e-health interventions specifically for pregnant adolescents, however

this current study aims to fill this gap and contribute to the development of e-health interventions that will benefit pregnant adolescents.

Similar to the current study, Kenny et al. (2016) developed a prototype of a mobile app and then showed this prototype to a small group of adolescents. During focus groups, participants in that study were asked for their opinions on the needs of adolescents in terms of mental health mobile technology.

‘Engagement’ and ‘Functionality’ were two themes derived from the analysis of the focus group data. Sub-themes for ‘Engagement’ were Content, Appearance and Incentive to use. Sub-themes for ‘Functionality’ were Information and advice, Access to Professional Help and Improved Mental Health Outcomes.

Furthermore, Safety, social interaction, promoting awareness, accessibility, gender and young people in control were the other themes identified in that study. The implications of this study in comparison to the current study, are that it shows us that the needs of pregnant adolescents are similar to the needs of adolescents that are not pregnant. Furthermore, it highlights the importance of having an intervention specifically for pregnant adolescents because their needs are slightly different to older women during pregnancy.

‘Positively Pregnant’ app – Feedback and Suggestions

The participants’ feedback on this app has been categorised into Positive and Negative Feedback. Interestingly, neither of the adolescent participants had negative feedback for the app however, they did have suggestions for how Positively Pregnant could be tailored to the needs of pregnant adolescents.

Four of the five participants gave positive feedback for the app, except for the TPU teacher. This was the only participant that was not interviewed in person

but rather over email. This meant that she did not have a ‘guided tour’ of the app but rather downloaded the app on her phone and looked at it in her own time. This will be discussed further in the limitations of the study.

Two of the participants liked that the app is ‘Easily Accessible’; it can be easily downloaded for free from the app stores for both Apple and Android phones. It is also ad free [Pregnant Teen] and does not need data or wifi – apart from the online resources [Midwife]. ‘Positively Pregnant’ is considered an E-health intervention, and one of the many benefits of these interventions is that they are easily accessible to a large population and involve small amounts of health provider time and resources (Bruce & Kutcher, 2016). Another benefit is that this type of intervention is portable, which means that users can access it when and where they need it (Podina et al., 2016). In the current study, participants responded that ‘Positively Pregnant’ is ‘Empowering’ for pregnant women. As previously mentioned, “Power is given back them” and they are encouraged to “take charge of their pregnancy” [Counsellor]. It also encourages “self-care” [Counsellor] and is individualised to the user [Pregnant Teen]. Because it is individualised to the user, it also gives them feedback on information that they have input into the app and what type of information or support might be helpful to them. In terms of its usefulness, ease of use, acceptability for pregnant adolescents and layout and wording of the app, the professional participants and the adolescent participants had a difference of opinion. Both adolescent participants believed that the app looked easy to use, and would be helpful to pregnant teenagers however, the professionals did not. Furthermore, both adolescent participants believed that the language was easy for them to understand, and they found the layout and style of the app interesting. Several of the participants liked the interactive nature of the

app, especially the parts of the app that participants could do an activity or do self-assessments. It is no surprise then, that both adolescent participants responded that they would use the “Know Yourself” and “Do Something” modules the most. The tracking of moods in particular was something that several of the participants thought would be helpful to pregnant teenagers. The ‘audio activities’ module was especially appealing to the Pregnant Teen in the current study. The Pregnant Teen responded that this would be her favourite part of the app because it “says what to do to try and relax when I’m stress or anxious”. There is evidence that guided imagery can reduce perceived stress in pregnant adolescents (Flynn et al., 2016). ‘Positively Pregnant’ provides several guided imagery activities in the ‘Do Something’ module. The Counsellor commented that “teenagers are doers rather than talkers”. This could be why both adolescent participants were drawn towards the interactive components of the app rather than the informative components. However, when asked about which module of the app would be most helpful to pregnant adolescents, both teen participants felt that it would be the ‘Find Out’ and ‘Conversation’ modules, which are the informative components of the app. The implications of this finding are possibly that, although pregnant adolescents enjoy doing activities and keeping their minds busy, they also know that they would benefit from learning about the reality of their situation. A further implication of this is that an intervention which provides both interactive and informative components could be most effective in supporting pregnant adolescents.

The professionals in the current study felt that the app as a whole would be very overwhelming for pregnant adolescents. Furthermore, the Counsellor was questioning pregnant adolescents’ ability to comprehend or even think deeply

enough about some of the things the app is encouraging them to think about. Two of the professionals in the current study responded that the app may not be suitable for teenagers because of their maturity level [Counsellor and TPU Teacher]. For example, the TPU Teacher responded that “older mature mothers” may find it helpful; however, the Counsellor suggested that teenagers may not have the “emotional maturity to think that deeply about themselves”. Furthermore, teenagers may not be self-aware enough to think about all of the topics of discussion in the ‘Conversations’ module and the app as a whole [Counsellor]. This concern about the complexity and amount of content in the app was the main negative feedback given by participants; however, there were plenty of suggestions from most of the participants for how PP could be tailored to the needs of pregnant adolescents.

Four of the five participants provided recommendations for changes to the Positively Pregnant app. The TPU teacher suggested that the app include Teen Specific Material such as “lots of pictures, perhaps even humour, related to things they’re into” [TPU Teacher]. Although ‘Positively Pregnant’ does not have a lot of pictures, it does have a section called ‘Have a laugh’ in the ‘Do Something’ module, with a link to funny baby videos on YouTube. The user is also provided with a game called ‘Hatch3’ where they match up little eggs to hatch them into little chicks. Possibly, if a different version of the app for pregnant adolescents was made, more things like this could be added. Several of the professionals in the current study responded that ‘Positively Pregnant’ could be used alongside a Healthcare Provider. The reasoning behind this was so that the pregnant adolescent had a knowledgeable person to help them to understand and process the different aspects of the app. Furthermore, it could be used as a tool by

counsellors working alongside pregnant adolescents [Counsellors]. Furthermore, the app may prompt the user to think about what they want to discuss during their appointments or ask their doctor or midwife any questions that may be raised whilst using the app [Midwife]. Because there is little to no evidence of research on pregnancy apps for teenagers, it is difficult to compare results of this study to others like it. However, in research including e-health interventions aimed at adolescents, there has been positive results. For example, the Mobile TYPE app was used in conjunction with the users paediatricians, and results showed that the program was helpful in helping paediatricians to understand their patients as well as the users feeling like it helped their paediatricians understand them (Reid et al., 2012). This suggest that using an e-health intervention such as ‘Positively Pregnant’ alongside the pregnant adolescents’ healthcare provider could be helpful to them. Further research into how this would work is suggested.

It was suggested that several things be added to the app such as: “who can take me to my appointments” in ‘Know my Village’ and “Baby’s Movements in ‘Know my Health under the ‘Know Yourself’ module [Midwife]. Furthermore, the Midwife suggested that more emphasis be placed on the benefits of physical activities for both mum and baby in the ‘Do Something’ module. Several suggestions were made for things to add to the ‘Conversations’ module, such as, “Breastfeeding Options” [Parenting Teen] and “Things to talk to the Midwife about” [Midwife]. The Midwife also suggested that we change the layout of the ‘Find Out’ module, putting the information and resources in order of the pregnancy trimester that they would be most relevant for. Lastly, “what to expect when giving birth” [Parenting Teen], in terms of what could go wrong during birth, but also about the experience of giving birth. There is a section about ‘when

something goes wrong' in the 'Positively Pregnant' app, however this is more to do with medical complications that can occur during pregnancy rather than during birth. There is also a section called 'Birth Plans and Fears', this is more about preparing the user for birth and encouraging them to create a plan about how they would like it to go. Of course, birth does not always go as planned and so the app encourages the user to talk to their midwife about other possibilities. Most, if not all the above suggestions could be considered pregnancy related rather than suggestions on changes that would make the app more relevant to adolescents. Although the above suggestions for changes to the app might not be teen specific, they do seem to address some of the challenges that pregnant teens experience and this is important to the current study.

The findings of this study, especially the feedback on the app and suggestions for how we could tailor the app to the needs of pregnant adolescents has implications for future research. These implications are discussed further below. This does not take away from the significance of this feedback however.

Strengths of the study

This type of study appears to be the only one of its kind; although there are studies about e-health mobile interventions for adolescents, there does not appear to be any research done on mobile interventions specifically for pregnant adolescents. The implications of this study may inspire others like it, to explore further how e-health interventions can be tailored or created to meet the needs of pregnant adolescents. Furthermore, learning about the perspectives of professionals working alongside pregnant adolescents has given insight into the types of supports that may be lacking in the fields of counselling, psychology, midwifery and education. Therefore, this research may inspire research in these fields as

well; in terms of, improving upon the services and resources that professionals in these fields provide to pregnant adolescents.

Limitations of the study

It is notable that neither of the adolescent participants gave any negative feedback about the app. It is possible that they perceived me as someone who was involved in the development of the app and therefore they might have been hesitant to be perceived as critical. In general, it is a limitation that any of the participants might have perceived me as having a strong investment in the content of the app.

The interview with the pregnant adolescent took place in her TPU classroom where there many distractions such as people walking through the room and her peers informing her that they were leaving to do an activity. Similarly, the interview with the Parenting Teen was cut short due to her baby waking up, so she became distracted looking after her, and talking with her partner who had also just woken up.

Another limitation was that most of the participants did not download the app and look at in their own time. The Parenting Teen had mentioned that she used the app during her pregnancy but admitted only using one part of the app. The TPU Teacher did use the app in her own, however based on some of her feedback it was clear she was not able to look through all of the app as she suggested adding things that the app already contains.

The small number of participants—two teens and three professionals—clearly limits the conclusions that can be drawn about the acceptability of this app to pregnant teenagers and may warrant another more comprehensive study with more participants using the app for a longer period of time as originally planned.

However, for this research, five participants from diverse viewpoints provided insight into the perspectives of people who are familiar with the needs of pregnant adolescents and some suggestions for how we can tailor the app to their needs. Another limitation of this study was that also, both adolescents were students at a TPU and so had a high level of support with both their education and their pregnancy. This type of support is not available to all pregnant adolescents and thus the challenges that pregnant adolescents experience may not be represented by the perspectives of the adolescent participants in this study. The professionals in this study, possibly with the exception of the TPU teacher, have experience working with pregnant adolescents in the community that do not have the kinds of support that both of the adolescent participants in this study receive from their respective TPU. This could be a possible reason for why there are differing accounts from the professionals and the adolescent participants.

Future Research

Future research may include a more comprehensive study with a larger population with the ability to use the app over a longer period of time. The original plan was to have pregnant adolescents use the app for a period of three months; during this time, they would also complete questionnaires as well as give feedback once a month. In this way, we could monitor mood changes, how often participants are using the app, and which parts of the app they are using the most. In this study, we only had what the participants said to base our findings off of. Furthermore, adolescents that are not receiving support from a TPU may provide further insight into the challenges that pregnant adolescents experience as well as the supports that are needed to manage these challenges. It would also be good to have information on whether this makes a difference to their wellbeing and health

status; a controlled trial comparing TPU students' health and wellbeing to non TPU students would provide this next step of development.

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Appendix A: Poster for 'Teen' and 'Professional' participants

Teen Pregnancy...

Full of changes, choices, and challenges?
...there's an app for that!



Want to help test a new smartphone app to guide mothers toward healthy stress management and wellbeing?

We are looking for pregnant/parenting women between the ages of 16-20 who are willing to take part in a focus group, to give feedback on a pregnancy app and how it can help them.

For more information, check out our webpage:

<http://psychology.waikato.ac.nz/positivelypregnant>,

facebook [@Positivelypregnantapp](https://www.facebook.com/Positivelypregnantapp),

e-mail me jordanabealing@gmail.com

or call 027 5169220



Teen Pregnancy...

Full of changes, choices, and challenges?
...there's an app for that!



Want to help test a new smartphone app to guide mothers toward healthy stress management and wellbeing?

We are looking for professionals working alongside pregnant and parenting teens to give feedback on a pregnancy app and how it can help them.

For more information, check out our webpage:

<http://psychology.waikato.ac.nz/positivelypregnant>,

facebook [@Positivelypregnantapp](https://www.facebook.com/Positivelypregnantapp),

e-mail me jordanabealing@gmail.com

or call 027 5169220



Appendix B: Emails sent for recruitment

Teen Pregnancy Research Participants NEEDED!



Jordana Bealing <jordanabealing@gmail.com>

Thu, Nov 22, 2018, 11:31 AM



to tinabk.ff, infoICAMHS, info.hamilton, lakes, waikato.amu, office, contact, pathwayscounsel, info, clinic, contact, talk ▾

Kia Ora,

Please find attached below a poster about an exciting project I am doing at the moment. A fantastic new mobile application to support women through pregnancy. We want to make this app helpful for teens, so we're needing pregnant/parenting teens to take part in a focus group session where they'll be shown our app and then asked their opinions on it and how we can improve.

I would really appreciate it if you would share this poster/info sheet with any pregnant/parenting teen clients you have.

Thank you so much :)



Jordana Bealing <jordanabealing@gmail.com>

Jan 15, 2019, 2:37 PM (3 days ago)



to tinabk.ff, infoICAMHS, info.hamilton, lakes, waikato.amu, office, contact, pathwayscounsel, info, clinic, contact, talk ▾

Do you work with pregnant/parenting teens?! I would love to talk to you about a pregnancy app I have helped to create. Its called 'Positively Pregnant' - I would greatly appreciate your feedback.

Naaku Noa,
Jordy



Appendix C: Letter sent to Principal of Fraser High School

25 August 2017

Dear Principal Crawford,

We have been working to develop a mobile phone app called “Positively Pregnant” to help pregnant women to manage the challenges and changes of pregnancy and to use this time to reflect on strengths, support systems, stresses and strategies. We would like to ask your permission to include the students from He Puawai in a project testing out this app.

We have been in contact with Lee Marchioni to discuss the possibility of Jordana Bealing (Masters student) and Carrie Barber (supervisor and leader of the app development team) coming into He Puawai to introduce the app to the pregnant students in the unit. We are hoping that Lee will discuss the opportunity of taking part in the project with the students, find out which of the students are interested in taking part, and invite them to the information and enrolment session.

Attached you will find an explanation of the procedure that we wish to undertake with the students. First, we will need to gain consent from students over 16 and parental consent from any students under 16. We would like the students to try out this app on their phones and then get their feedback on how they are finding it, and whether it is helpful to them. We will come to He Puawai to lead focus groups for feedback and at that point we will also ask the students to fill out some questionnaires (list attached).

This study has been reviewed and approved by the University of Waikato School of Psychology Research Ethics Committee.

What would be the process for having this project considered for the He Puawai Unit? We are happy to come and meet with you to discuss this further. We can

also provide you with the full ethics proposal, if you'd like (which includes copies of all questionnaires).

Could you please contact me (Jordana) to let me know what steps I might take next?

My email is jordanabealing@gmail.com. You can also reach me on my mobile 0275169220.

Kind Regards,

Jordana Bealing

Carol Cornsweet Barber, Ph.D.

Director, Clinical Psychology Training Programme

Registered Clinical Psychologist

Appendix D: Consent forms for ‘Teen’ and ‘Professional’ participants

PARTICIPANT CONSENT FORM (PROFESSIONAL)

A completed copy of this form should be retained by both the researcher and the participant.

Research Project: Positively Pregnant App Pilot

Please complete the following checklist. Tick () the appropriate box for each point.	YES	NO
1. I have read the Participant (Professional) Information Sheet (or it has been read to me) and I understand it.		
2. I have been given sufficient time to consider whether or not to participate in this study		
3. I am satisfied with the answers I have been given regarding the study and I have a copy of this consent form and information sheet		
4. I understand that taking part in this study is voluntary (my choice) and that I may withdraw from the interview at any time		
5. I have the right to decline to answer any questions I do not feel comfortable with		
6. I know who to contact if I have any questions about the study in general.		
7. I understand that my participation in this study is confidential and that no material, which could identify me personally, will be used in any reports on this study.		
8. I wish to receive a copy of the findings		

Declaration by participant:

I agree to participate in this research project and I understand that I may withdraw at any time. If I have any concerns about this project, I may contact the convenor of the Psychology Research and Ethics Committee (Dr Rebecca Sargisson, phone 07 557 8673, email: rebeccas@waikato.ac.nz)

Participant's name (Please print):

Signature:

Date:

Declaration by member of research team:

I have given a verbal explanation of the research project to the participant, and have answered the participant's questions about it. I believe that the participant understands the study and has given informed consent to participate.

Researcher's name (Please print):

Signature:

Date:

**PARTICIPANT CONSENT FORM
(TEEN)**

A completed copy of this form should be retained by both the researcher and the participant.

Research Project: Positively Pregnant App Pilot

Please complete the following checklist. Tick () the appropriate box for each point.	YES	NO
1. I have read the Participant (Teen) Information Sheet (or it has been read to me) and I understand it.		
2. I have been given sufficient time to consider whether or not to participate in this study		
3. I am satisfied with the answers I have been given regarding the study and I have a copy of this consent form and information sheet		
4. I understand that taking part in this study is voluntary (my choice) and that I may withdraw from the focus group at any time		
5. I have the right to decline to answer any questions I do not feel comfortable with		
6. I know who to contact if I have any questions about the study in general.		
7. I understand that my participation in this study is confidential and that no material, which could identify me personally, will be used in any reports on this study.		
8. I wish to receive a copy of the findings		

Declaration by participant:

I agree to participate in this research project and I understand that I may withdraw at any time. If I have any concerns about this project, I may contact the convenor of the Psychology Research and Ethics Committee (Dr Rebecca Sargisson, phone 07 557 8673, email: rebeccas@waikato.ac.nz)

Participant's name (Please print):

Signature:

Date:

Declaration by member of research team:

I have given a verbal explanation of the research project to the participant, and have answered the participant's questions about it. I believe that the participant understands the study and has given informed consent to participate.

Researcher's name (Please print):

Signature:

Date:

Appendix E: Information sheets for ‘Teen’ and ‘Expert’ participants

Positively Pregnant: Evaluation and Refinement of a mobile phone app.

(Participant – Teen)

Pregnancy is a time of change—physical, social, financial, psychological. These changes can be exciting and joyful, but also challenging and stressful.

We have been working to develop a mobile phone app called “Positively Pregnant” to help pregnant teens to manage the challenges and changes of pregnancy and use this time to reflect on strengths, supports, stresses, and strategies—what works for you to thrive and cope with whatever life brings? If you participate in this research, you will take part in a focus group session where you will be given a ‘guided tour’ of the app), and we will ask you to give us feedback about what you thought.

The purpose of this project is to try out and evaluate Positively Pregnant, to see how helpful it is specifically for teenagers, and what suggestions people have to make it better. Positively Pregnant has four different types of modules in it; there are some (called “Know Yourself”) that help you to take inventory and assess yourself, some (called “Conversations”) that provide suggestions for things you and your partner or support person could talk and think about in preparation for parenting, activities (called “Do Something”) that are things you can do to relax and to manage stress and improve wellbeing, and some information (called “Find Out”) about the social and emotional side of becoming a mother.

If you're in the study, you will be invited to take part in a group discussion with other

pregnant/parenting teenagers, you will be shown through the modules of the app and then asked questions about what you thought. You won't be asked any personal questions.

Your feedback will be anonymous, you don't need to answer any question you prefer not to, and you can withdraw at any time.

This study has been reviewed and approved by the University of Waikato School of Psychology Research Ethics Committee. If you have any questions or concerns about your rights as a participant in this research study, you can contact the chair of that committee, Rebecca Sargisson (rebeccas@waikato.ac.nz).

If you have any questions, please feel free to ask! This project is being done as part of a master's thesis, by Jordana Bealing, jordanabealing@gmail.com; the leader of the app development project is Carrie Barber, phone number 07 837 9221; e-mail address ccbarber@waikato.ac.nz.

Thank you for your interest in finding out about this project!

Positively Pregnant: Evaluation and Refinement of a mobile phone app
(Expert)

Pregnancy is a time of change—physical, social, financial, psychological. These changes can be exciting and joyful, but also challenging and stressful.

We have been working to develop a mobile phone app called “Positively Pregnant” to help pregnant teens to manage the challenges and changes of pregnancy and use this time to reflect on strengths, supports, stresses, and strategies—what works for them to thrive and cope with whatever life brings.

The purpose of this project is to try out and evaluate Positively Pregnant, to see how helpful it is specifically for teenagers, and what suggestions people have to make it better. Positively Pregnant has four different types of modules in it; there are some (called “Know Yourself”) that help the user to take inventory and assess themselves, some (called “Conversations”) that provide suggestions for things the user and their partner or support person could talk and think about in preparation for parenting, activities (called “Do Something”) that are things the user can do to relax and to manage stress and improve wellbeing, and some information (called “Find Out”) about the social and emotional side of becoming a mother.

I am asking for your input as a professional working with pregnant and parenting adolescents.

If you choose to take part in the study I would like to meet with you in person.

You will be shown through the app and asked for your feedback on what you think would be beneficial supports for pregnant and parenting teenagers.

We will ask for your input in three ways.

- First, I would like to ask you some questions about what type of help/support is needed for pregnant and parenting teenagers today. What sorts of issues do you see in this group that need attention.
- Second, I will give you a guided tour of the app; that means you will be shown either on the researcher's phone or on the computer, different parts of the app. You are welcome to ask as many questions as you like about the different modules and we can look at them in more detail if you like.
- Third, I would like your feedback on the aspects of the app you think would be most helpful to pregnant teenagers and the parts that you think need changing to better suit their age group.

Your feedback will be anonymous, you don't need to answer any question you prefer not to, and you can withdraw at any time. This study has been reviewed and approved by the University of Waikato School of Psychology Research Ethics Committee. If you have any questions or concerns about your rights as a participant in this research study, you can contact the chair of that committee, Rebecca Sargisson (rebeccas@waikato.ac.nz).

If you have any questions, please feel free to ask! This project is being done as part of a master's thesis, by Jordana Bealing, jordanabealing@gmail.com; the leader of the app development project is

Carrie Barber, phone number 07 837 9221; e-mail address ccbarber@waikato.ac.nz.

Thank you for your interest in finding out about this project

Appendix F: List of organisations/pages contacted for recruitment**Email:**

Family Planning

Youthline

Impact

Plunket

Youth Horizons

Attitude

Discovery for teens

Family works

Families achieving balance

Life skills for life trust

Te Tuinga Whanau

Te Waiariki Pura Trust

Whanau Ora Community Network

Mana Social Services

NZ Teen Parent Units

Thrive

Facebook Pages:

Birth and Beyond

Rotorua Parents centre

Rotorua Midwives

Hearts and Minds NZ

Breastmates

Single Parent Services

Kids Waikato

Waikato Family Centre

House of Grace

Waikato Home Birth Association

Appendix G: Interview questions

Interview Topics

I'd like to start out by asking about you a few questions about the needs of pregnant adolescents.

- What are the challenges for pregnant teens?
- What types of support do you think that pregnant teens need?

Now I'd like to ask you about your general thoughts and comments on Positively Pregnant, and then we'll go through the different parts and ask about what you thought about them, and then ask for your ideas and suggestions about how to improve things.

- In general, do you feel like the content of the app is applicable to your situation?
- What about the style? Words? the look of it?
- Does it look easy to use, or confusing?
- What part of the app would you use the most? Why?
- What part did you like best? Why?

- How about the Know Yourself parts
 - o Would you try all parts/which ones?
 - o Any suggestions for other things we could include?

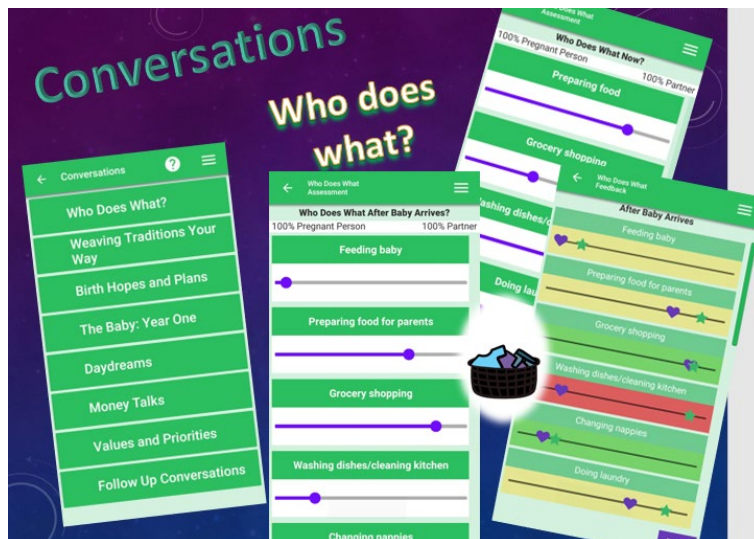
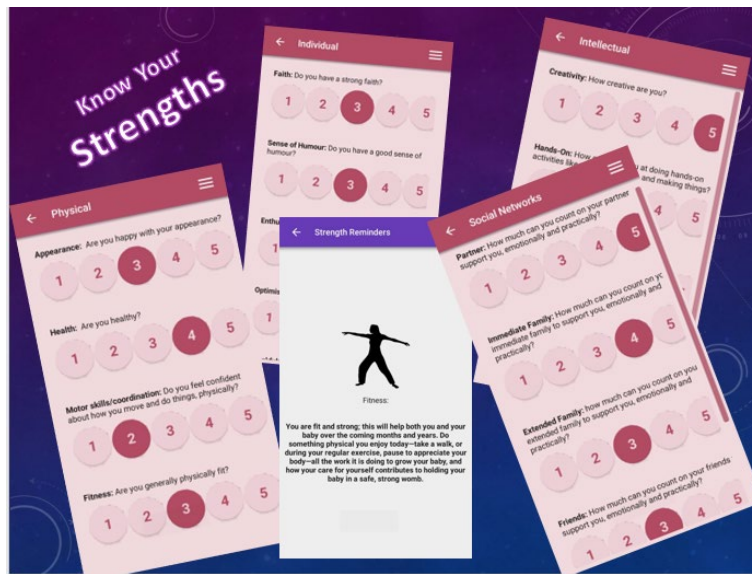
- How about the Conversations—
 - o Which parts would you use?
 - o How would you use these? (Partners, single parents, parents)
 - o Any suggestions for other topics we could include?

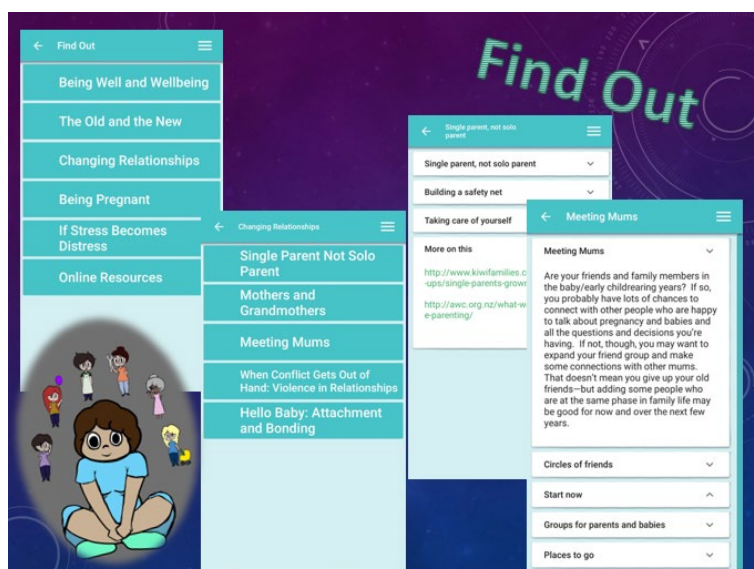
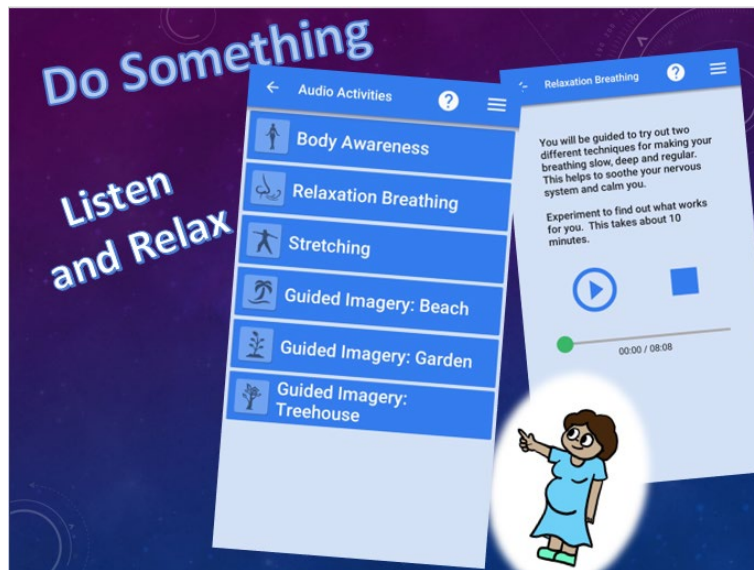
- How about the Do Something—activities—
 - o Which ones would you try?
 - o What did you think?
 - o Any suggestions?

- How about the Find Out bits
 - o Would you read them?
 - o Were they too long? Too short?
 - o What type of information would you find most helpful?
 - o Any suggestions for more?

- What should we definitely keep?
- What should we get rid of?
- How could we improve it?
- Any ideas how we could personalize it, so it would be most helpful for someone in your situation?

Appendix H: Screenshots of slideshow used during feedback sessions





Appendix I: List of topics in the ‘Find Out’ module

Category	Topic
Being Well and Wellbeing	
	Taking care of yourself
	Information without overload
	Mind and body as one
	What is stress?
	Stress and the body
	Coping with stress
The Old and the New	
	Who am I now?
	Culture, Tradition, and Finding your way
	Māori Tikanga for Pregnancy and Birth
	Spirituality, Faith, Mindfulness
	Control, Choice, and Responsibility
	Money Woes
Changing Relationships	
	Single Parent Not Solo Parent
	Mothers and Grandmothers
	Meeting Mums
	When Conflict Gets Out of Hand: Violence in Relationships
	Hello Baby: Attachment and Bonding
	Building Baby’s Brain

Being Pregnant	
	Pregnancy After Infertility
	Pregnancy After Loss
	When Something Goes Wrong: Medical Complications
	Your Pregnant Body
	Birth Plans and Fears
	I'm Not So Sure About This...
If Stress Becomes Distress	
	Managing Worries
	Managing Moods
	Your Own Worst Enemy?
	If Your Childhood was not so Rosy
	Perinatal Mental Health – Maintaining Your Balance Through Change and Challenge
	What if? Getting Help